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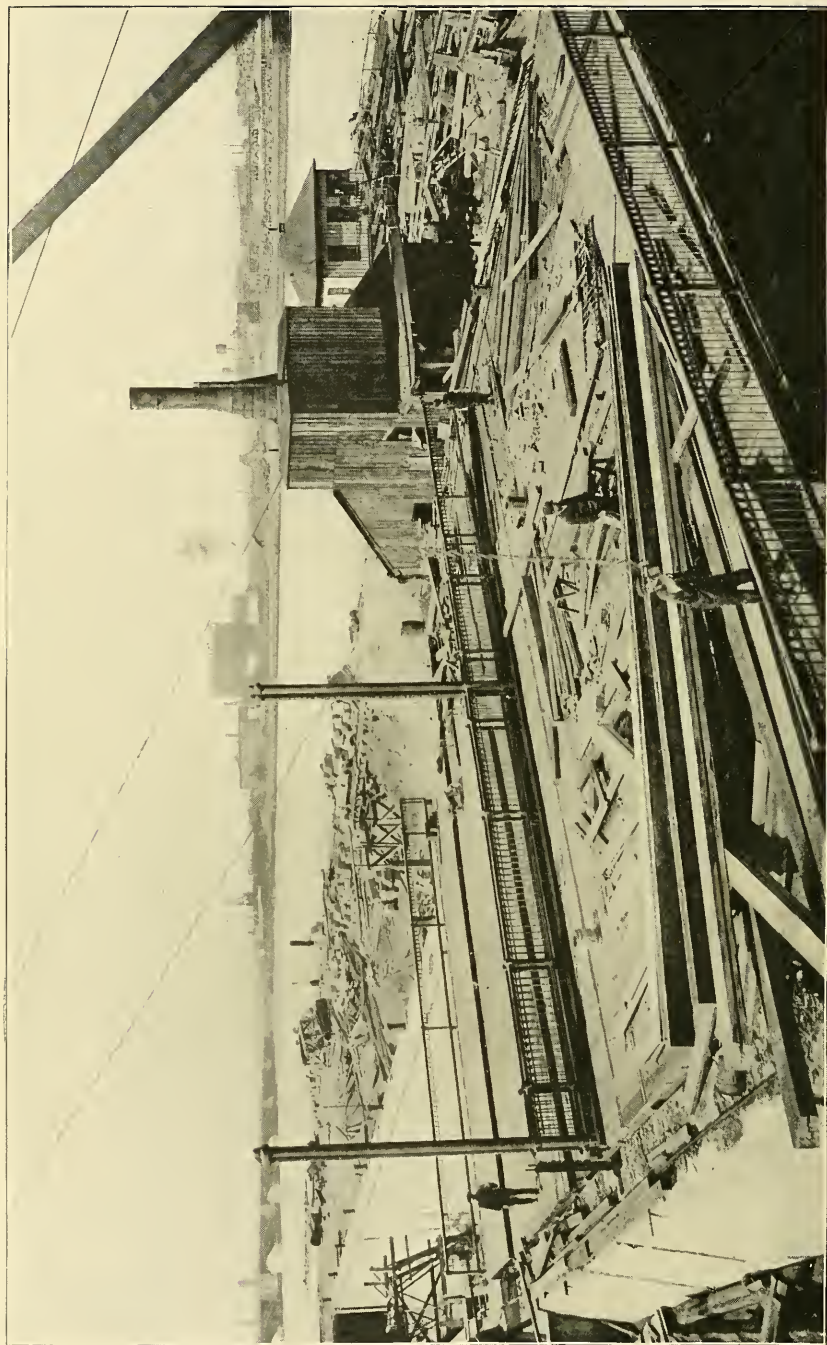
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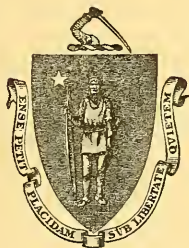


DRAWBRIDGE OVER LOCK — LOOKING TOWARD CAMBRIDGE BRIDGE.

FIFTH ANNUAL REPORT  
OF THE  
CHARLES RIVER BASIN  
COMMISSION.

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DECEMBER 1, 1907.



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# Commonwealth of Massachusetts.

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## FIFTH REPORT OF THE CHARLES RIVER BASIN COMMISSION.

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*To His Excellency the Governor and the Honorable Council of the Commonwealth of Massachusetts.*

The Commission appointed under chapter 465 of the Acts of 1903, known as the Charles River Basin Commission, has the honor to make the following report of its proceedings for the fiscal year ending Nov. 30, 1907. As required by law, the Commission filed, on Jan. 14, 1908, with the Secretary of the Commonwealth a statement of its expenditures and receipts, which is printed herewith. The Commission also filed an abstract of its doings for the fiscal year.

### I. ORGANIZATION AND ADMINISTRATION.

#### (a) *The Commission, Officers and Employees.*

The membership of the Commission remained the same as in the preceding year: Henry S. Pritchett, Chairman, Henry D. Yerxa and Joshua B. Holden. William S. Youngman continued as Secretary, and Hiram A. Miller as Chief Engineer.

No change was made in the administrative office force. Twenty-nine engineers and inspectors were engaged during the year, some for summer work and some to take the place of men who had resigned. At the end of the year there were nine additional engineers and inspectors in the employ of the Commission. Other changes and promotions in the engineering force are described in the report of the Chief Engineer, appended.

(b) *Offices and Buildings.*

The office of the Charles River Basin Commission is located on the sixth floor of the Standish Building, No. 367 Boylston Street. The principal field office is at No. 12 Bridge Street, East Cambridge. For its work on the Boston Embankment the Commission maintained a smaller field office at No. 108 Chestnut Street. The center of much of the Commission's mechanical work is in the steel shed at the corner of Charles and Leverett streets, Boston.

II. THE DAM AND LOCK.

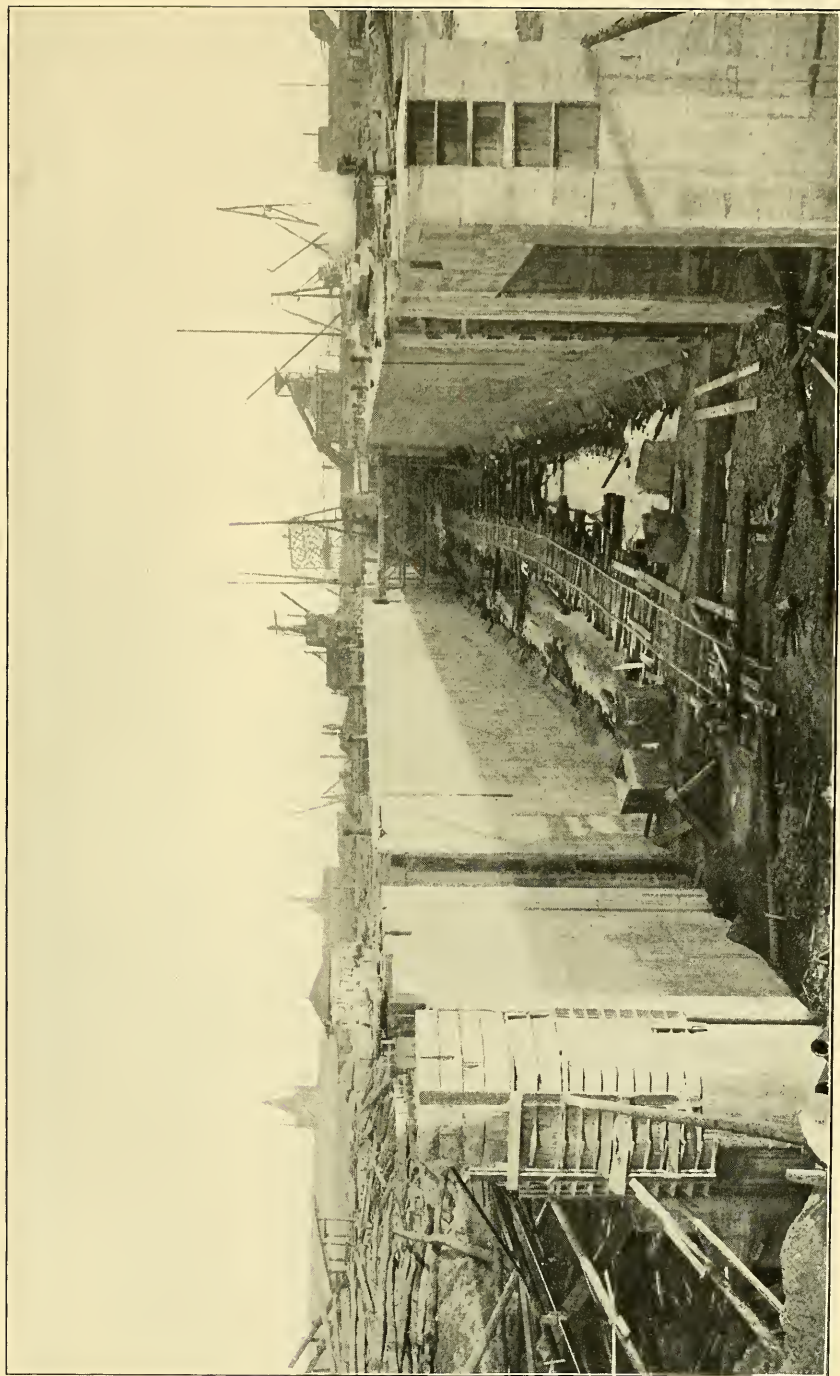
(a) *The Lock and Lock-gates in the Boston Cofferdam.*

The masonry for the Lock was completed during the year, although work within the Boston coffer-dam was practically at a standstill throughout the winter, owing to the extremely cold weather which began early and continued well into March. Some of the men employed by the Commission were occupied in assembling the stop-planks for the ends of the Lock and placing them in position. At the same time the tracks for the lock-gates were laid. The material for the lock-gates, which was fabricated in Wheeling, W. Va., was not received here until autumn, but by the end of the year the gate in the downstream recess was very nearly assembled and a good start had been made on the gate in the up-stream recess. The thirteen sluice-gates to be used on the lock-gates for filling and emptying the Lock were delivered at the site of the work, and the work of erection was begun before the end of the year.

The Scherzer rolling lift double drawbridge over the lower end of the Lock is substantially completed. A temporary operating tower for the controllers for the lock-gates and the drawbridge was built at the south side of the roadway near the drawbridge.

(b) *Passage of Vessels through the Lock will be Accelerated.*

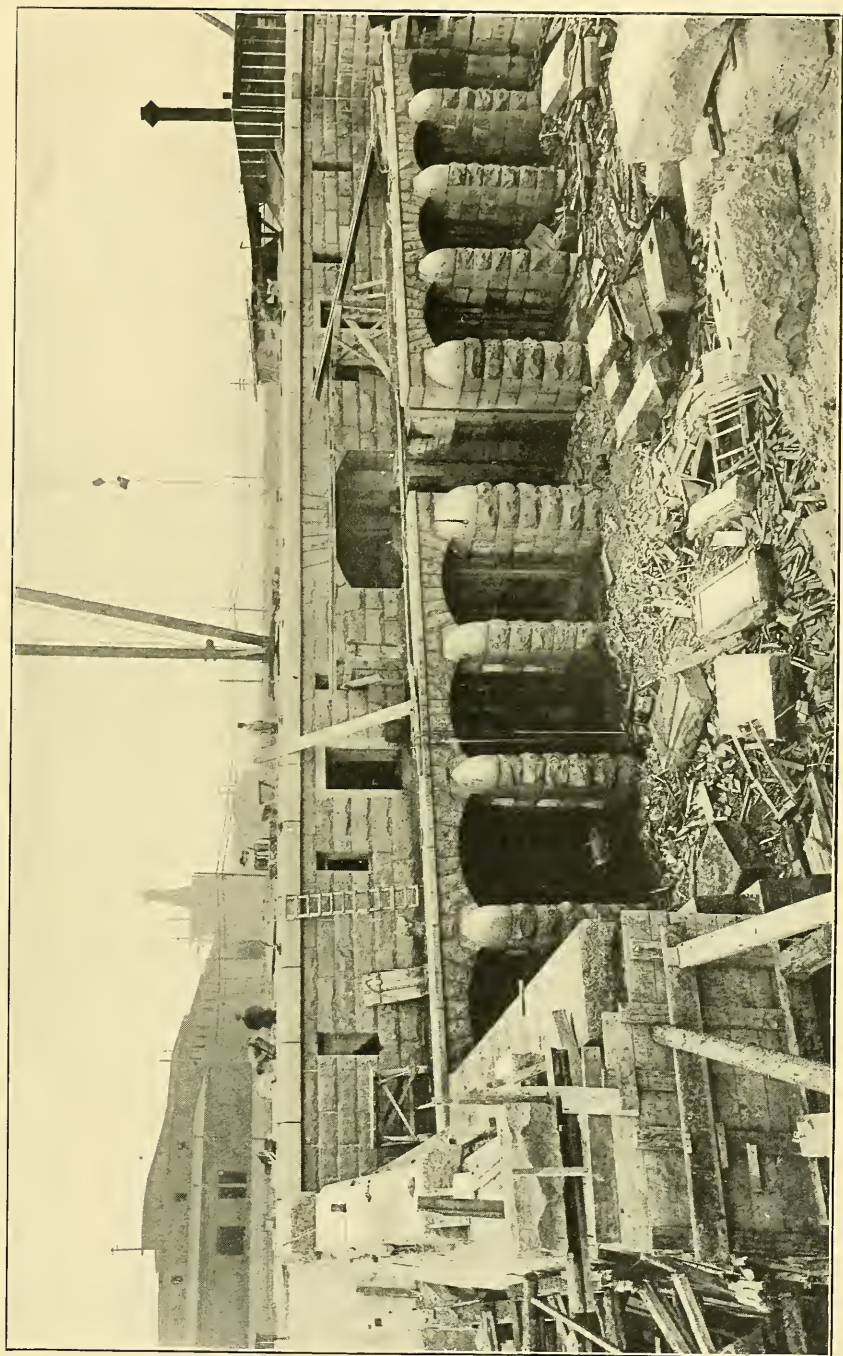
Two electrically operated capstans have been furnished and installed on the easterly side wall of the Lock by the American Ship Windlass Company, of Providence, R. I. By means of



LOCK — SOUTH END.







SLUICES—UP-STREAM FACE.





these capstans the progress of vessels through the Lock will be expedited, so that the delay to street traffic caused by opening the drawbridge will be made as slight as possible.

(c) *The Sluices in the Cambridge Cofferdam.*

Owing to the severity of the weather, work on the sluices in the Cambridge coffer-dam was suspended from Dec. 15, 1906, to April 11, 1907, when work was resumed and pushed as rapidly as possible. The masonry work of the sluices was practically completed about the first of August. All the sluice-gates which were to be installed at this point have been erected, together with most of their operating machinery. A test was made of one of the gates and it was found satisfactory. The switchboards and controllers, however, have not yet been put in place.

(d) *The Shut-off Dam.*

The temporary dam which the Commission will construct between the Boston and Cambridge coffer-dams and will connect with the Cambridge shore is called the shut-off dam. As the work upon the sluices and the Lock approaches completion, it becomes possible for the Commission to take up the problem of closing the river without interfering with navigation or with the convenience of the people living on the banks of the Basin.

**The shut-off dam will not only accomplish the purpose of greatly facilitating the work of building the permanent Dam, but it will have the effect of giving to the public the use of the Basin for a considerable period before the completion of the permanent Dam and the roadway and park area which are to be parts of the structure.**

It is obvious that it would be impossible to construct a dam consisting chiefly of earthwork, with the tide ebbing and flowing twice daily. As the space between the two ends of the dam narrowed, the velocity of the currents would constantly increase, the earth filling would be scattered by the tides, and it would finally become impossible to keep the work in position. To avoid this difficulty the Commission has begun the construction of its shut-off dam, which will be primarily a pile structure. Pile bents will be driven about 8 feet apart across the river between the two coffer-dams, and timber sluice-gates will be

hung between them in such a way that when the time comes for making the final shut off they may be quickly lowered into place to make a continuous timber wall across the river. This will, of course, stop all tidal flow, and it will be possible to put in the earth filling and make it stay in place. Vessels will then be locked through, and the sluices will be used to regulate the height of the Basin in practically the same way that they will be used in the permanent Dam.

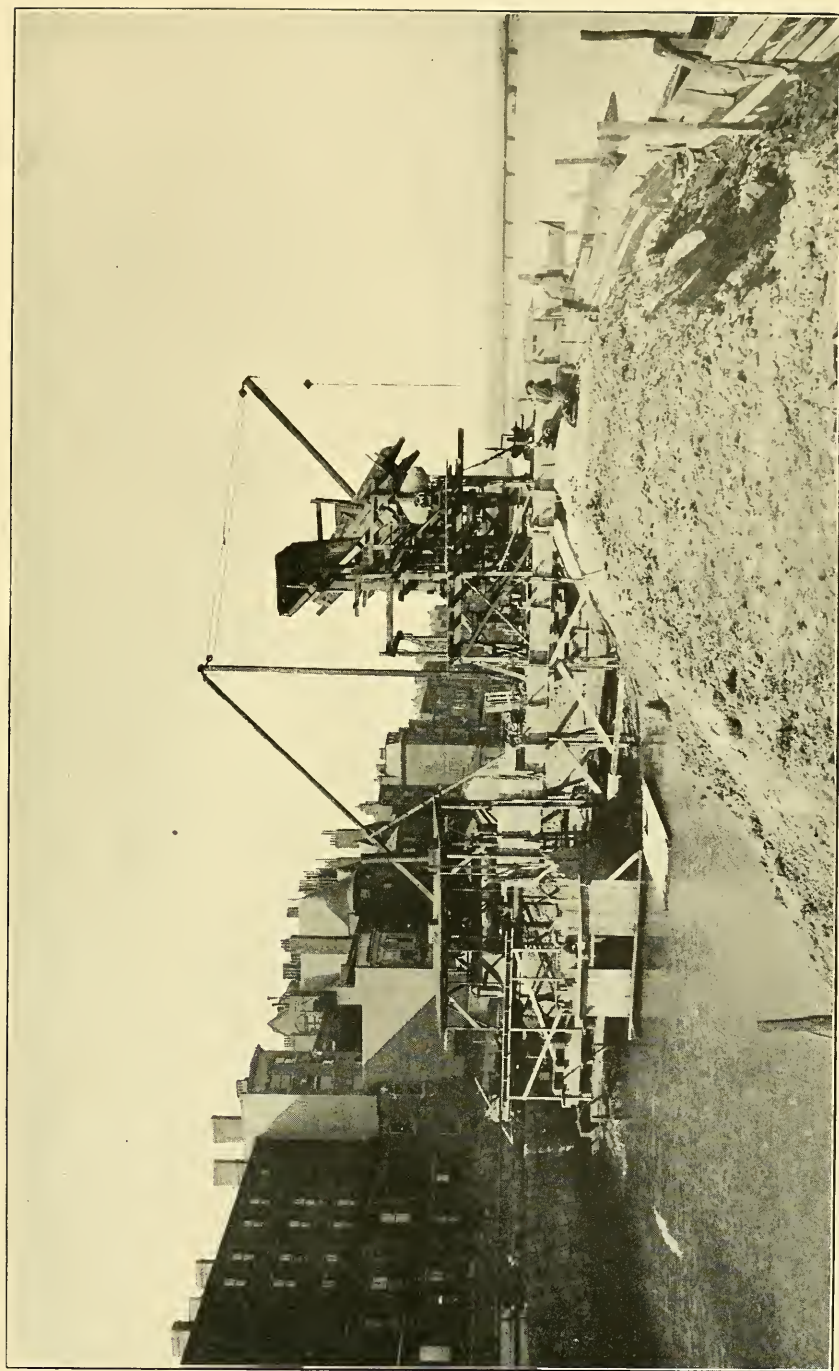
### III. THE BOSTON EMBANKMENT.

The Commission has made no changes in its plans for the Boston Embankment from those described in its fourth report. It has participated in the deliberations of the Metropolitan Park Commission, constituting with that Board the joint board created by chapter 404 of the Acts of 1907 for the purposes of granting locations for boat-houses on the embankment, in the rear of Charles and Brimmer streets.

Work on the embankment continued steadily throughout the year and considerable progress was made. The pile-driving and the filling with earth continued during the winter whenever the weather permitted, and the masonry work was resumed as early in the spring as possible. Nearly all the piles required for that part of the Basin wall to be built by the contractor for Section 1, which extends from the new Cambridge Bridge to a point near Berkeley Street, have been driven; and the masonry of the wall itself is completed from the bridge to Mt. Vernon Street, with the exception of the coping which, under the terms of the contract, is not to be put in place until after the embankment which is behind the wall is completed. A considerable amount of filling has also been put in on sections 2 and 3 of the Boston Embankment, extending from Berkeley Street nearly to Charlesgate East.

### IV. DELAY AND CHANGES IN THE COMMISSION'S WORK DUE TO THE RIVERBANK SUBWAY ACT OF 1907.

Owing to enforced delays which are authorized by law, it will be impossible for the Commission to complete the Boston Embankment by the time the Basin is established. Section 2



BOSTON EMBANKMENT — CONTRACTOR'S PLANT.



of chapter 573 of the Acts of 1907, which provides for the construction by the Boston Transit Commission of the Riverbank subway within the Boston Embankment which this Commission is now building, directs that:—

The Charles River Basin Commission shall make such changes in its plans for constructing the embankment and park aforesaid, and the conduit, drains or other structures therein or appurtenant thereto, and in the construction thereof, as the transit commission may determine to be required in connection with the proper location and construction of the subway herein provided for, and shall postpone or omit any part of the work provided for . . . which it may be necessary or expedient to postpone or which may be rendered unnecessary by or in view of the work herein provided for.

Under authority of this section the Boston Transit Commission has made several requests for changes in the Commission's plans and work, all of which have been complied with.

#### V. THE CRAIGIE TEMPORARY BRIDGE.

The temporary bridge has been maintained during the year without any serious delay to traffic. One or two small fires occurred on the bridge during the summer, but they were extinguished before any appreciable damage was done.

#### VI. THE MARGINAL CONDUITS.

##### (a) *The Boston Marginal Conduit.*

Work on the conduit progressed at a reasonable rate and at the end of the year it had been completed from the end of Section 2, near the Cambridge Bridge, to a point near Mt. Vernon Street, and piles had been driven for a large part of the conduit remaining to be built. Seven-tenths of a mile of this conduit have been completed and 1.1 miles are now in process of construction. Besides intercepting the various sewer overflows from the cross streets along its course, the conduit will connect with the Stony Brook channels at Charlesgate East and may also be used to provide circulation for the Fens Ponds.



(b) *The Cambridge Marginal Conduit.*

The contract for the Cambridge Marginal Conduit was awarded about the middle of August and work was commenced on the 30th. The stop-plank chambers near Lechmere Canal were practically completed at the end of the year. The work of building the inverted siphon for the Cambridge Marginal Conduit at Lechmere Canal was made a separate contract, which was executed on September 12. A portion of the work had been done at the end of the year.

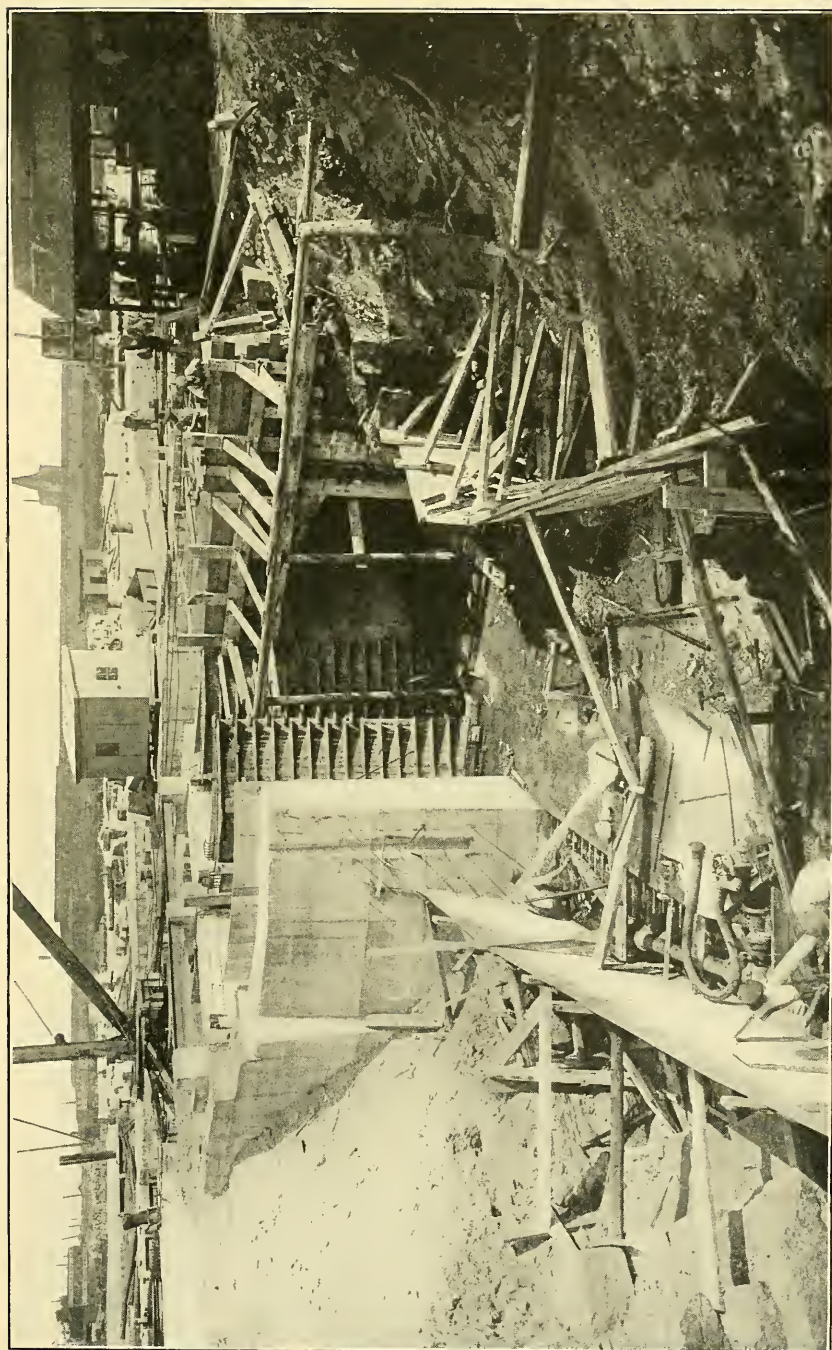
(c) *The Sewer Overflow Connections with the Boston Marginal Conduit.*

As fast as the completed portion of the conduit has reached the streets at which the sewer overflows discharge into the river, the concrete connections from these overflows have been built to the conduit and temporary wooden outlets have been built extending from the conduit to points a little outside of the proposed Basin wall. At the end of the year the sewer overflow connections at Pinckney and Mt. Vernon streets had been completed and the temporary outlets at Dartmouth and Fairfield streets were nearly done, although the permanent connections with the outlets at the existing wall had not been built.

VII. DREDGING AND PILE-DRIVING AT THE WHARVES IN BROAD AND LECHMERE CANALS.

Piles have been driven and capped in front of nearly all the properties in both Broad and Lechmere canals, — a total distance of about 1.8 miles of piling, — and the dredging to be done in Broad Canal is practically completed between First and Sixth streets. A channel about 60 feet wide has been dredged from the Basin to and opposite the wharf of the Wellington-Wild Coal Company. About 8,000 cubic yards of material have been excavated.





BOSTON MARGINAL CONDUIT — NEAR LOCK.



## VIII. LEGISLATION OF 1907.

The Commission made no recommendation to the Legislature of 1907 for legislation.

The most important act passed affecting its powers is chapter 404 (which is printed in Appendix A of this report), relating to the granting of locations for boat-houses on the Boston Embankment.

Besides chapter 269, relative to the hours of labor, which will be referred to later, there was one other act of the Legislature of 1907 which has an important bearing on the Commission's work. This is chapter 573, from which a clause has been quoted on page 5, and which provides for the Riverbank subway to be built in the Boston Embankment now under construction by this Commission.

## IX. TAKINGS OF PROPERTY.

For the purposes of driving piles and dredging in Broad and Lechmere canals, as provided in section 4 of the Charles River Basin Act, the Commission made takings in Cambridge in front of the properties of Annie B. Matthews and Sarah M. Fay, heirs of Howard Coon, Walter J. Connery and Walter A. Wentworth, Sylvester Tower Company, and Mary A. Linehan.

For the purpose of connecting Section 2 of the Boston Marginal Conduit in the Charlesbank with Section 3 of the same conduit in the Boston Embankment, the Commission took an easement on the land of the Massachusetts Charitable Eye and Ear Infirmary on Charles Street in Boston.

## X. LITIGATION.

A settlement was made with E. Ricker, Son & Co., petitioners for damages on account of taking of leasehold rights and buildings on the Proctor property in East Cambridge.

The following new petitions for damages were filed during the year, chiefly on account of the taking dated Oct. 8, 1906, by the Commission of riparian rights if any should prove to be held by private individuals within the area of the Boston

Embankment: Isaac Cohen, George W. Parker, The Home for Aged Women, Henry L. Higginson *et al.*, trustees, Alfred Bowditch *et al.*, trustees, Francis Skinner, Robert Treat Paine, trustee, Maria M. McClure, Georgianna Hopkins, Harry S. Hall, George Wigglesworth *et al.*, Caroline S. Freeman, Laura L. Case, Mary L. Ware, Massachusetts Charitable Eye and Ear Infirmary (on account of two takings), Annie Fields, Elizabeth S. Beal, Carleton Hunneman, Thomas P. Beal *et al.*, trustees, Maria W. Sleeper, Helen A. Homans, Wallace L. Pierce, Edward W. Hutchins, George A. Goddard, Henry Parkman *et al.*, trustees, Robert C. Heaton *et al.*, John Parkinson, Jonathan H. Mann *et al.*, Fannie L. Prince, James R. Hooper, Sarah F. Niles *et al.*, Katherine B. Edmands, Katherine C. Pierce, Louise P. Inches, Georgianna O. Taylor, Rebecca W. Brown *et al.*, Mary C. Sears, Francis Shaw, Mary M. Taylor, Richard D. Sears, Charles E. Cotting *et al.*, trustees, Robert C. Hooper *et al.*, executors, Octave L. Apthorp, John D. Williams, trustee, Lillian C. Prince, Harriet L. Putnam, Frances E. Jackson, Henry F. Allan (2), Richard Sullivan, Ruth W. Sears, Schuyler S. Bartlett *et al.*, trustees, Ellen M. Abbott, Katharine M. Abbott, George B. Shattuck, Ralph B. Williams, Frederick C. Shattuck *et al.*, Helen G. Means, Heloise Meyer, Martha P. Stackpole, Esther H. Stanton, Christiana S. Whitney *et al.*, Arthur P. Tarbell *et al.*, trustees, Edward Jewell, Catherine A. Barstow, Helen C. Moseley, Mary H. Loring *et al.*, Julia Coolidge.

## XI. CONTRACTS.

### (a) Labor.

Since chapter 269 of the Acts of 1907 became effective, the Commission has put into all of its contracts the provision of law that no laborer, workman or mechanic working within the Commonwealth on any of the Commission's work shall be requested or required to work more than eight hours in any calendar day. The Commission has also complied with a further provision of the same act that no laborer, workman or mechanic directly in the employ of the Commonwealth shall be requested or required to work more than forty-eight hours



in any week. The effect of this statute will be to cause a considerable increase in the cost of the Commission's work.

(b) *List of Contracts.*

A list of the contracts awarded and pending during the year will be found in Appendix B. The contracts are discussed in the Chief Engineer's report, hereto annexed.

(c) *Sums held back from Contractors.*

The amounts reserved from sums due all contractors on monthly estimates, and not payable until after the completion of the contracts or until final settlement, are as follows: —

No. of Contract.	Name.	Work.	Amount.
1	Holbrook, Cabot & Rollins Corporation.	Dam and Lock in the Charles River.	\$40,000 00
23	Holbrook, Cabot & Rollins Corporation.	Piles along walls of canals and Basin.	6,215 22
24	American Bridge Company of New York.	Scherzer rolling lift bridge, . .	5,250 00
25	Coffin Valve Company, . . .	Sluice-gates at the sluices in the Dam.	5,300 00
27	Coffin Valve Company, . . .	Sluice-gates on the lock-gates in the Lock.	1,452 50
30	New Jersey-West Virginia Bridge Company.	Lock-gates, . . . . .	2,700 00
41	Coffin Valve Company, . . .	Sluice-gates at the sluices and Boston Marginal Conduit.	2,251 75
44	Coleman Brothers, . . . .	Section 3 of the Boston Marginal Conduit and Section 1 of the Boston Embankment.	29,616 85
50	Holbrook, Cabot & Rollins Corporation.	Sections 4 and 5 of the Boston Marginal Conduit and Sections 2 and 3 of the Boston Embankment.	12,364 60
59	The Lockwood Manufacturing Company.	Timber ice-run gate, . . . .	76 23
63	Baltimore Bridge Company, . .	Lock-gate operating chain supports.	771 45
69	Camden Iron Works, . . . .	Cast-iron pipes and special castings.	684 25
70	Patrick McGovern, . . . .	Main portion of the Cambridge Marginal Conduit.	401 63
76	Hiram W. Phillips, . . . .	Inverted siphon for the Cambridge Marginal Conduit, at Lechmere Canal.	130 50
			\$107,214 98

## XII. HEARINGS, MEETINGS AND CONFERENCES.

The Commission gave during the year twenty-four hearings, at which a total of fifty-two persons were heard, besides holding sixty-two formal meetings and many conferences, as will more fully appear in its official minutes.

## XIII. ISSUE OF BONDS.

On Jan. 29, 1907, the Commission advised the Treasurer of the Commonwealth to make available additional funds to the amount of \$1,150,000 for the year 1907. Bonds to the amount above named were issued and sold under the title of the "Charles River Basin Loan." The total issue of bonds on account of the Charles River Basin Loan to Dec. 1, 1907, is \$2,400,000.

## XIV. PAYMENTS TO THE SINKING FUND.

Payments to the sinking fund of the Charles River Basin Loan during the year amounted to \$41,913.64. The total payments to the sinking fund to Dec. 1, 1907, were \$107,026.44.

## XV. REPORTS ISSUED BY THE COMMISSION.

Fifteen hundred reports were printed, at a cost of \$554.83. Of this number the Commission received for distribution only 450 copies to meet the demands of officials and citizens of the thirty-eight cities and towns which are to pay for the Charles River Basin work. Though the supply of reports for distribution by the Commission this year was larger than last, the demand, which has always exceeded the supply, was still further increased.

## XVI. STATEMENT OF EXPENDITURES AND RECEIPTS.

The following statement of expenditures and receipts was filed on Jan. 14, 1908:—

The total amount of expenditures from Dec. 1, 1906, to Nov. 30, 1907, is \$688,545.66. The total amount from July 29, 1903, the date when the Commission was organized, to Nov. 30, 1907, is \$1,635,183.89, and the total amount of receipts between the same dates is \$2,082.49.

The general character of these expenditures and receipts is shown in the following tables:—



*Expenditures.*

	For the Year Ending Nov. 30, 1907.	From Beginning of Work to Nov. 30, 1907.	
<i>Administration.</i>			
Commissioners, . . . . .	\$10,000 00	\$43,024 69	
Secretary, . . . . .	3,000 00	8,483 33	
Clerks and stenographers, . . . . .	1,265 31	3,508 15	
Legal services, . . . . .	10 00	18 00	
Traveling, . . . . .	478 15	771 88	
Stationery and printing, . . . . .	844 00	2,608 82	
Postage, express and telegrams, . . . . .	92 31	193 85	
Furniture and fixtures, . . . . .	35 00	479 01	
Alterations and repairs of building, . . . . .	—	123 10	
Telephone and lighting, . . . . .	297 86	542 65	
Rent, . . . . .	285 72	1,339 30	
Miscellaneous expenses, . . . . .	249 08	398 65	
	\$16,557 43		\$61,491 43
<i>Engineering.</i>			
Chief, principal assistant and division engineers, . . . . .	\$14,090 38	\$47,420 73	
Engineering assistants, . . . . .	43,504 43	102,814 66	
Consulting engineers, . . . . .	4,262 70	10,801 10	
Inspectors, . . . . .	26,050 75	46,888 70	
Architect, . . . . .	1,890 16	2,984 88	
Traveling, . . . . .	624 07	1,436 11	
Wagon hire, . . . . .	19 25	79 75	
Stationery and printing, . . . . .	1,280 79	4,064 96	
Postage, express and telegrams, . . . . .	67 05	212 34	
Instruments, tools and boats, . . . . .	3,035 44	7,335 03	
Engineering and drafting supplies, . . . . .	722 42	1,889 09	
Books, maps and photographs, . . . . .	862 45	2,611 89	
Furniture and fixtures, . . . . .	810 19	3,131 89	
Alterations and repairs of building:—			
Main office, . . . . .	16 00	1,108 14	
Sub-offices, . . . . .	134 86	456 29	
Telephone and lighting, main office, . . . . .	295 32	905 86	
Telephone, lighting, heating, water and care of building, sub offices, . . . . .	643 94	1,200 11	
Rent, main office, . . . . .	1,714 32	7,160 83	
Rent of field offices, . . . . .	180 00	431 45	
Unclassified supplies, . . . . .	687 49	840 83	
Miscellaneous expenses, . . . . .	130 19	339 29	
	101,902 20		244,113 93
<i>Construction—Preliminary.</i>			
Advertising, . . . . .	\$257 47	\$1,032 66	
Labor, . . . . .	837 92	6,051 34	
Professional services, . . . . .	8 40	8 40	
Traveling, . . . . .	—	19 08	
Water rates, . . . . .	—	3 45	
Freight and express, . . . . .	6 25	67 42	
Jobbing and repairing, . . . . .	—	35 68	
Tools, machinery, appliances and hard- ware supplies, . . . . .	5 40	216 16	
Castings, ironwork and metals, . . . . .	4 00	222 09	
Iron pipe and valves, . . . . .	—	98 96	
Fuel, oil and waste, . . . . .	2 40	65 05	
Lumber, . . . . .	29 07	367 15	
Cement, . . . . .	—	24 75	
Sand, . . . . .	—	3 00	
Unclassified supplies, . . . . .	23 50	38 19	
Miscellaneous expenses, . . . . .	97 52	488 68	
	1,271 93		8,742 06
<i>Construction—Contracts.</i>			
Contracts completed and final payments made prior to Dec. 1, 1906, . . . . .	—	\$117,818 66	
Contract No. 1, Holbrook, Cabot & Rol- lins Corporation, . . . . .	\$133,268 70	541,978 53	
Contract No. 2, United States Wood Pre- serving Co., . . . . .	750 00	5,532 52	
Contract No. 5, Henry R. Worthington, . . . . .	4,766 50	7,626 40	
Contract No. 19, The Scherzer Rolling Lift Bridge Co., . . . . .	—	3,500 00	
Contract No. 23, Holbrook, Cabot & Rol- lins Corporation, . . . . .	24,964 95	68,552 93	
	\$163,750 15	\$119,731 56	\$745,009 04
<i>Amounts carried forward, . . . . .</i>			\$314,347 42

*Expenditures — Continued.*

	For the Year Ending Nov. 30, 1907.		From Beginning of Work to Nov. 30, 1907.	
<i>Amounts brought forward, . . .</i>	\$163,750 15	\$119,731 56	\$745,009 04	\$314,347 42
<i>Construction — Contracts — Con.</i>				
Contract No. 24, American Bridge Co. of New York, . . .	27,723 81		29,750 00	
Contract No. 25, Coffin Valve Co., . . .	15,900 00		15,900 00	
Contract No. 27, Coffin Valve Co., . . .	4,357 50		4,357 50	
Contract No. 28, Coffin Valve Co., . . .	1,109 50		3,772 30	
Contract No. 30, New Jersey-West Virginia Bridge Co., . . .	15,300 00		15,300 00	
Contract No. 32, Geo. W. Gale Lumber Co., . . .	220 04		3,639 14	
Contract No. 33, Chelmsford Foundry Co., . . .	1,322 24		1,928 71	
Contract No. 34, Geo. McQuesten Co., . . .	—		54 15	
Contract No. 35, Gibby Foundry Co., . . .	1,047 98		3,295 65	
Contract No. 37, American Ship Windlass Co., . . .	1,575 00		1,575 00	
Contract No. 38, Westinghouse Electric & Manufacturing Co., . . .	2,635 40		2,635 40	
Contract No. 40, Chapman Valve Manufacturing Co., . . .	850 54		850 54	
Contract No. 41, Coffin Valve Co., . . .	6,755 25		6,755 25	
Contract No. 43, The William Cramp & Sons Ship & Engine Building Co., . . .	770 09		770 09	
Contract No. 44, Coleman Bros., . . .	154,383 06		167,828 84	
Contract No. 45, Richard F. Keough, . . .	850 00		850 00	
Contract No. 46, New England Structural Co., . . .	7,380 00		7,380 00	
Contract No. 47, Geo. McQuesten Co., . . .	790 72		790 72	
Contract No. 48, The Lumsden & Van Stone Co., . . .	629 40		629 40	
Contract No. 49, The William Cramp & Sons Ship and Engine Building Co., . . .	1,260 00		1,260 00	
Contract No. 50, Holbrook, Cabot & Rollins Corporation, . . .	70,066 09		70,066 09	
Contract No. 51, Lynch & Woodward, . . .	541 00		541 00	
Contract No. 52, Aberthaw Construction Co., . . .	1,542 48		1,767 79	
Contract No. 53, L. M. Ham & Co., . . .	1,223 00		1,223 00	
Contract No. 54, Coldwell-Wilcox Co., . . .	419 00		419 00	
Contract No. 55, Gibby Foundry Co., . . .	571 01		571 01	
Contract No. 56, Camden Iron Works, . . .	6,060 00		6,060 00	
Contract No. 57, Wm. H. Wood & Co., . . .	2,762 70		2,762 70	
Contract No. 58, Hiram W. Phillips, . . .	3,931 34		3,931 34	
Contract No. 59, The Lockwood Manufacturing Co., . . .	431 97		431 97	
Contract No. 61, Fred A. Houdlette & Son, . . .	1,306 00		1,306 00	
Contract No. 62, Aberthaw Construction Co., . . .	2,375 17		2,375 17	
Contract No. 63, Baltimore Bridge Co., . . .	4,371 55		4,371 55	
Contract No. 64, Gibby Foundry Co., . . .	4,871 00		4,871 00	
Contract No. 65, R. D. Wood & Co., . . .	675 00		675 00	
Contract No. 67, H. P. Converse & Co., . . .	2,155 56		2,155 56	
Contract No. 68, Geo. McQuesten Co., . . .	982 40		982 40	
Contract No. 69, Camden Iron Works, . . .	4,168 36		4,168 36	
Contract No. 70, Patrick McGovern, . . .	2,275 91		2,275 91	
Contract No. 73, H. P. Converse & Co., . . .	1,032 19		1,032 19	
Contract No. 76, Hiram W. Phillips, . . .	739 50		739 50	
Contract No. 77, Gibby Foundry Co., . . .	439 65		439 65	
Contract No. 82, David S. McCabe, . . .	578 00		578 00	
Contract No. 83, F. M. Ferrin, . . .	591 43		591 43	
		522,720 99		1,128,727 35
<i>Construction — Additional.</i>				
Advertising, . . . . .	\$2 00		\$2 00	
Labor, . . . . .	28,504 23		59,843 10	
Professional services, . . . . .	6 00		208 00	
Traveling, . . . . .	55		1 41	
Freight and express, . . . . .	240 82		364 69	
Jobbing and repairing, . . . . .	267 92		890 68	
Tools, machinery, appliances and hardware supplies, . . . . .	1,390 50		7,664 15	
Castings, ironwork and metals, . . . . .	2,190 61		4,502 52	
<i>Amounts carried forward, . . .</i>	\$32,602 63	\$642,452 55	\$73,476 55	\$1,448,074 77

*Expenditures — Concluded.*

	For the Year Ending Nov. 30, 1907.		From Beginning of Work to Nov. 30, 1907.	
<i>Amounts brought forward, . . .</i>	\$32,602 63	\$642,452 55	\$73,476 55	\$1,443,074 77
<i>Construction — Additional — Con.</i>				
Iron pipe and valves, . . . . .	660 48		2,961 29	
Paint and coating, . . . . .	657 93		693 39	
Fuel, oil and waste, . . . . .	601 88		1,043 24	
Lumber and field buildings, . . . . .	1,953 72		6,332 84	
Cement and stone, . . . . .	13 00		19 05	
Sand, . . . . .	22 65		62 65	
Municipal and corporation work, . . . . .	35 63		891 60	
Telephone, lighting and power, . . . . .	1,391 45		3,123 02	
Unclassified supplies, . . . . .	39 34		296 83	
Miscellaneous expenses, . . . . .	—	37,978 71	25 65	88,926 11
<i>Real Estate.</i>				
Legal and expert, . . . . .	\$217 85		\$550 60	
Care and disposal, . . . . .	146 55		146 55	
Payment <i>pro tanto</i> under chapter 317, Acts of 1904, . . . . .	—		94,735 86	
Settlements, . . . . .	7,750 00	8,114 40	7,750 00	103,183 01
Totals, . . . . .		\$688,545 66		\$1,635,183 89

The foregoing expenditures have been distributed among the various objects or works as follows:—

	For the Year Ending Nov. 30, 1907.	From Beginning of Work to Nov. 30, 1907.
Administration, . . . . .	\$16,557 43	\$61,491 43
Dam, . . . . .	113,175 83	357,296 33
Lock, . . . . .	110,917 77	414,678 19
Temporary bridge and approaches, . . . . .	21,126 98	133,570 07
Drawbridge, . . . . .	41,807 48	74,885 51
Highway, . . . . .	46 20	156 12
Dredging and pile-driving in Basin, . . . . .	7,522 97	27,565 91
Broad Canal, . . . . .	26,632 83	71,472 09
Lechmere Canal, . . . . .	21,884 79	30,596 37
Boston Embankment, . . . . .	195,407 20	219,207 31
Boston Marginal Conduit, . . . . .	119,839 08	228,657 22
Cambridge Marginal Conduit, . . . . .	13,627 10	15,607 34
Totals, . . . . .	\$688,545 66	\$1,635,183 89

*Receipts.*

	For the Year Ending Nov. 30, 1907.	From Beginning of Work to Nov. 30, 1907.
<i>To the Credit of the Loan Fund.</i>		
Buildings, . . . . .	\$3 00	\$3 00
Labor, tools, supplies and reimbursements, . . . . .	206 00	269 00
<i>To the Credit of the Sinking Fund.</i>		
Rents, . . . . .	395 16	1,810 49
Totals, . . . . .	\$604 16	\$2,082 49

The foregoing receipts have been credited to the various objects or works as follows:—

	For the Year Ending Nov. 30, 1907.	From Beginning of Work to Nov. 30, 1907.
Dam, . . . . .	\$400 16	\$1,816 99
Lock, . . . . .	47 56	49 06
Temporary bridge and approaches, . . . . .	42 44	101 44
Drawbridge, . . . . .	81 00	81 00
Dredging and pile-driving in Basin, . . . . .	2 00	2 00
Broad Canal, . . . . .	10 00	10 00
Lechmere Canal, . . . . .	7 00	7 00
Boston Marginal Conduit, . . . . .	14 00	15 00
Totals, . . . . .	\$604 16	\$2,082 49

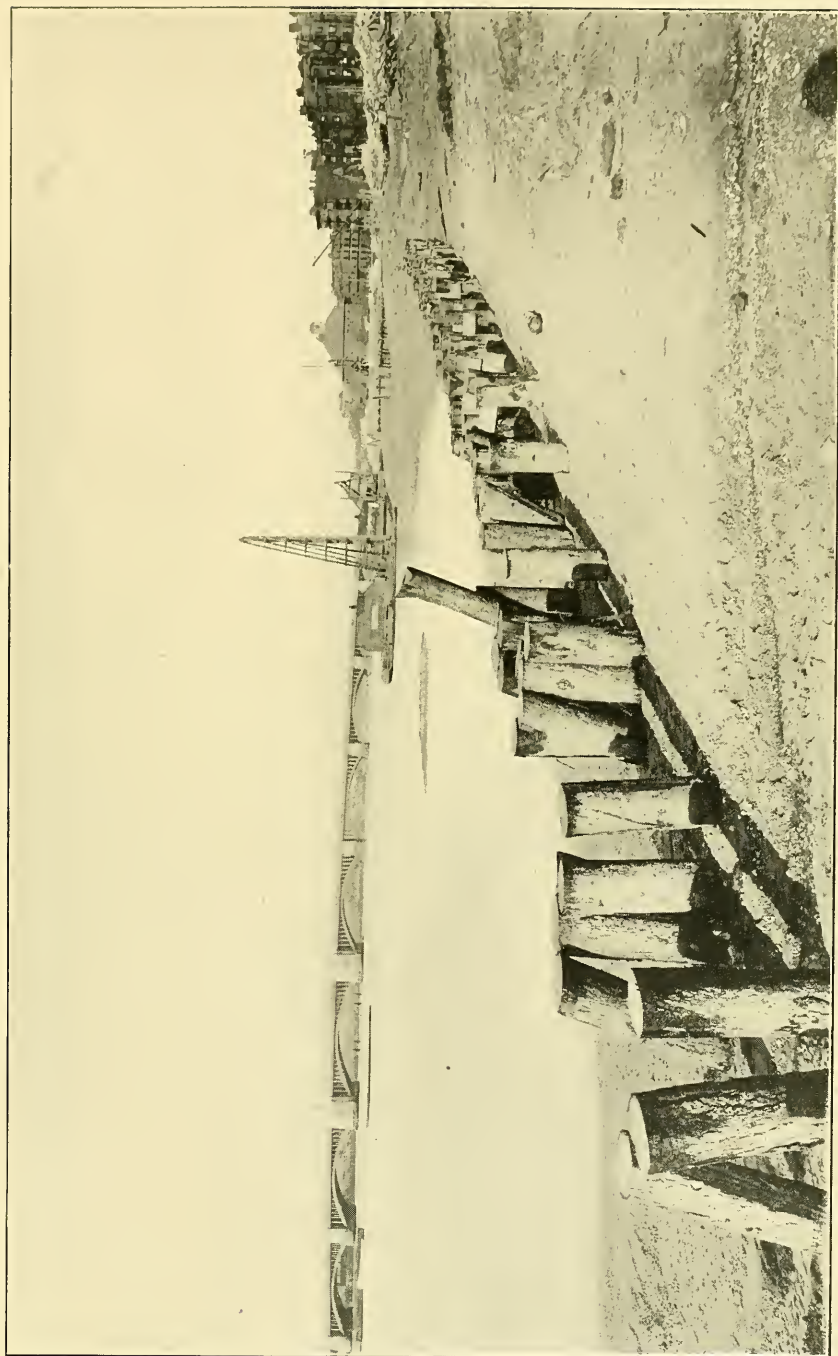
The report of the Chief Engineer follows.

In Appendix A will be found chapter 465 of the Acts of 1903 (original Charles River Basin Act) and chapters 65 of the Acts of 1905 and 368 and 402 of the Acts of 1906, which amend the same; also chapter 107 of the Resolves of 1904, chapter 158 of the Acts of 1906 and chapter 404 of the Acts of 1907.

Respectfully submitted,

HENRY S. PRITCHETT,  
HENRY D. YERXA,  
JOSHUA B. HOLDEN,  
*Charles River Basin Commission.*

Boston, March 17, 1908.



BOSTON EMBANKMENT — PILES FOR BASIN WALL.







## REPORT OF THE CHIEF ENGINEER.

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*To the Charles River Basin Commission.*

GENTLEMEN:—The following is a report of the work of the engineering department for the year ending Nov. 30, 1907.

### ORGANIZATION.

Mr. John L. Howard continued in charge of field work as division engineer until Sept. 21, 1907, when he was promoted to the rank of principal assistant engineer.

Mr. Edward C. Sherman, division engineer, continued in charge of designing, drafting and other office work.

Mr. Frederic P. Stearns continued to act as consulting engineer.

Mr. Guy Lowell was consulted in architecture and landscape architecture.

Mr. J. R. Worcester was consulted in regard to lock-gate trucks, and inspected the shopwork on some structural material constructed in Boston.

Mr. Arthur D. Little was consulted in regard to use of lubricants on the lock-gate trucks, which will be submerged in salt water.

Prof. Samuel C. Prescott, of the Massachusetts Institute of Technology, made an expert examination of the condition of the Stony Brook conduits.

Mr. Staunton B. Peck, of Chicago, Ill., was consulted in regard to the design of the lock-gate operating chains.

The engineering force at the beginning of the year numbered 69, and was increased from time to time as the work required, until September 21, when it numbered 83. At the end of the year it numbered 77.

The names of the assistants in the engineering department, not mentioned above, who have been employed for not less than one month, are given below, with the positions last held, together with an indication of the work performed by them:—

*Division Engineers.*

- John N. Ferguson, . . . In charge of work on the canals under contracts Nos. 1 and 23, and on the Boston Embankment and Boston Marginal Conduit under contracts Nos. 44 and 50; also in charge of the measurements of the flow of the river at Waltham and of the inspection of the sewer overflows into the Basin between Craigie Bridge and Cottage Farm.
- J. Albert Holmes, . . . In charge of work under Contract No. 1 on the Dam and Lock, the drawbridge, and the sluices; and under contracts Nos. 70 and 76 on the Cambridge Marginal Conduit.

*Mechanical Engineer.*

- Walton H. Sears, . . . Designs for steam and air piping, lock-gate operating machinery, lock-gate chain supports, lubricating system for lock-gate trucks, and sluice-gates and operating machinery; studies of air compressor plant, lock-gate tracks, and miscellaneous mechanical devices.

*Electrical Engineer.*

- Arthur I. Plaisted, . . . Electrical design and construction, and the erection of metal work at the Lock and drawbridge.

*Assistant Engineers.*

- Walter R. Kattelle, . . . Designs, studies and estimates for masonry and structural steel work; design of building over the lower lock-gate recess.
- Wilbur T. Wilson, . . . Designs and studies for masonry.
- Robert E. Barrett, . . . Designs and studies for masonry and for timber submerged outlets from the Boston Marginal Conduit.
- Morton F. Sanborn, . . . In charge of work on the Boston Marginal Conduit and the Boston Embankment under Contract No. 44.

Walter E. Wheeler, . .	In charge of work on the Lock and drawbridge.
Walter N. Charles, . .	In charge of office work and calculations.
Robert E. Wise, . . .	Designs, studies and estimates for various structures.
Arthur L. Bridgham, . .	In charge of work on the sluices.

*Instrumentmen, Draftsmen and Rodmen.*

Bertram I. Hall, . . .	Instrumentman.
Milton J. Adams, . . .	Instrumentman.
Frank V. Andrews, . . .	Instrumentman.
Dow H. Nicholson, . . .	Instrumentman.
Arthur E. Tarbell, . . .	Instrumentman.
Ernest E. Lothrop, . . .	Instrumentman.
Sydney W. Bampton, . .	Instrumentman.
Frederick H. Burke, . .	Instrumentman.
Ralph W. Emerson, . . .	Instrumentman.
Timothy Guiney, . . .	Instrumentman.
James Hayes, Jr., . . .	Instrumentman.
Daniel P. Kelley, . . .	Instrumentman.
William A. G. Moffatt, . .	Instrumentman.
Alphonsus O'Farrell, . .	Instrumentman.
Horace C. Sawyer, . . .	Instrumentman.
Arthur E. Spencer, . . .	Instrumentman.
Albert J. Holmes, . . .	Draftsman.
Franklin J. Van Hook, . .	Draftsman.
Charles C. Carroll, . . .	Draftsman.
Robert W. Mawney, . . .	Draftsman.
John Ayer, . . . . .	Draftsman.
Ray E. Shedd, . . . . .	Draftsman.
Edward S. Brown, . . . .	Rodman.
Charles E. Chace, . . . .	Rodman.
William J. Lumbert, . . . .	Rodman.
Charles J. O'Donnell, . . .	Rodman.
William F. Bowes, . . . .	Rodman.
John F. Callahan, Jr., . .	Rodman.
Arthur G. C. Chapman, . .	Rodman.
George S. Coleman, . . . .	Rodman.
Lester S. Daniels, . . . .	Rodman.
Everett H. Fernald, . . . .	Rodman.
Thomas R. Hazelum, . . . .	Rodman.
Nehemiah B. Hunt, . . . .	Rodman.
Thomas J. Magner, . . . .	Rodman.
William P. Monahan, . . . .	Rodman.

George A. Montague, . . .	Rodman.
Frederick J. Welch, . . .	Rodman.
Joseph P. Wood, . . .	Rodman.
Henry H. Damon, . . .	Rodman.
William F. Donovan, . . .	Rodman.
James J. Greene, . . .	Rodman.
Campbell Hunt, . . .	Rodman.
Edward L. Lincoln, . . .	Rodman.
Francis W. K. Smith, . . .	Rodman.
Charles M. Upham, . . .	Rodman.
Ralph W. Wales, . . .	Rodman.
Herbert O. Welsch, . . .	Rodman.
John R. Wolff, . . .	Rodman.
Leon A. Woodward, . . .	Rodman.
Monroe Ames, . . .	Rodman.
Ernest N. Briggs, . . .	Rodman.
Matthew W. Horgan, . . .	Rodman.
George W. Meserve, . . .	Rodman.
Edward T. O'Keefe, . . .	Rodman.
Walter N. Secord, . . .	Rodman.
James McKnight, . . .	Rodman.

*Inspectors.*

Charles E. Baker, Jr., . . .	Engineering inspector, — on dredging.
Leroy P. Henderson, . . .	Engineering inspector, — on dredging.
Henry M. McCue, . . .	Engineering inspector, — on dredging.
Frank I. Barrett, . . .	Inspector, — on pile-driving.
Samuel B. Horton, . . .	Inspector, — on concrete masonry of Boston Marginal Conduit.
Franklin L. Mason, . . .	Inspector, — on Lock and Boston Mar- ginal Conduit masonry, also on timber for lock-gates and stop-planks.
John P. McKnight, . . .	Inspector, — on concrete masonry at sluices.
Samuel Taylor, . . .	Inspector, — on pile-driving.
William A. Kenrick, . . .	Inspector, — on pile-driving.
George O. Souci, . . .	Inspector, — on pile-driving.
Thomas L. Whelan, . . .	Inspector, — on pile-driving and ma- sonry.
Martin F. Culbert, . . .	Inspector, — on masonry.
Walter A. Livermore, . . .	Inspector, — on pile-driving.
Bernard E. Grant, . . .	Assistant inspector and timekeeper.

*Stenographers and Clerks.*

Jennie L. Rawson,	. . .	Stenographer and clerk, — administrative work, accounts and letters.
Mabel F. Paton,	. . .	Stenographer and clerk.
Edith F. White,	. . .	Stenographer and clerk.
Helen B. Choate,	. . .	Stenographer and clerk.
Charlotte L. Briggs,	. . .	Stenographer.
Ruby H. Graves,	. . .	Stenographer.
Mary A. Fisher,	. . .	Stenographer.
Herbert A. Main,	. . .	Stenographer.
William F. Mitchell,	. . .	Stenographer.
William H. Walsh,	. . .	Stenographer.
Alfred Wm. Treen,	. . .	Clerk.
William J. Dresser,	. . .	Messenger.

In addition to the above regular employees, Mr. Herbert L. Sherman, 12 Pearl Street, Boston, continued to have charge of the cement testing; Mr. William R. Conard, of Burlington, N. J., continued in charge of inspection of pipes and specials manufactured in that locality; Stowell & Cunningham, of Albany, N. Y., were employed as inspectors of mill and shop work on structural steel for the drawbridge, lock-gates and other structural material; the Pittsburgh Testing Laboratory, of Pittsburgh, Pa., was employed to inspect the construction of the lock-gate operating machinery; Mr. Squire Howarth, 7 Regent Square, Roxbury, an expert machinist, inspected material being made at various foundries and machine shops; Prof. C. E. Fuller, of the mechanical engineering department of the Massachusetts Institute of Technology, made such physical tests on twisted steel rods, cast iron, bronze, etc., as was necessary to determine that such materials conformed to the specified requirements.

The principal engineering office was continued at 367 Boylston Street, Boston; and the two field offices were continued, one at 12 Bridge Street, East Cambridge, the other at 108 Chestnut Street, Boston.

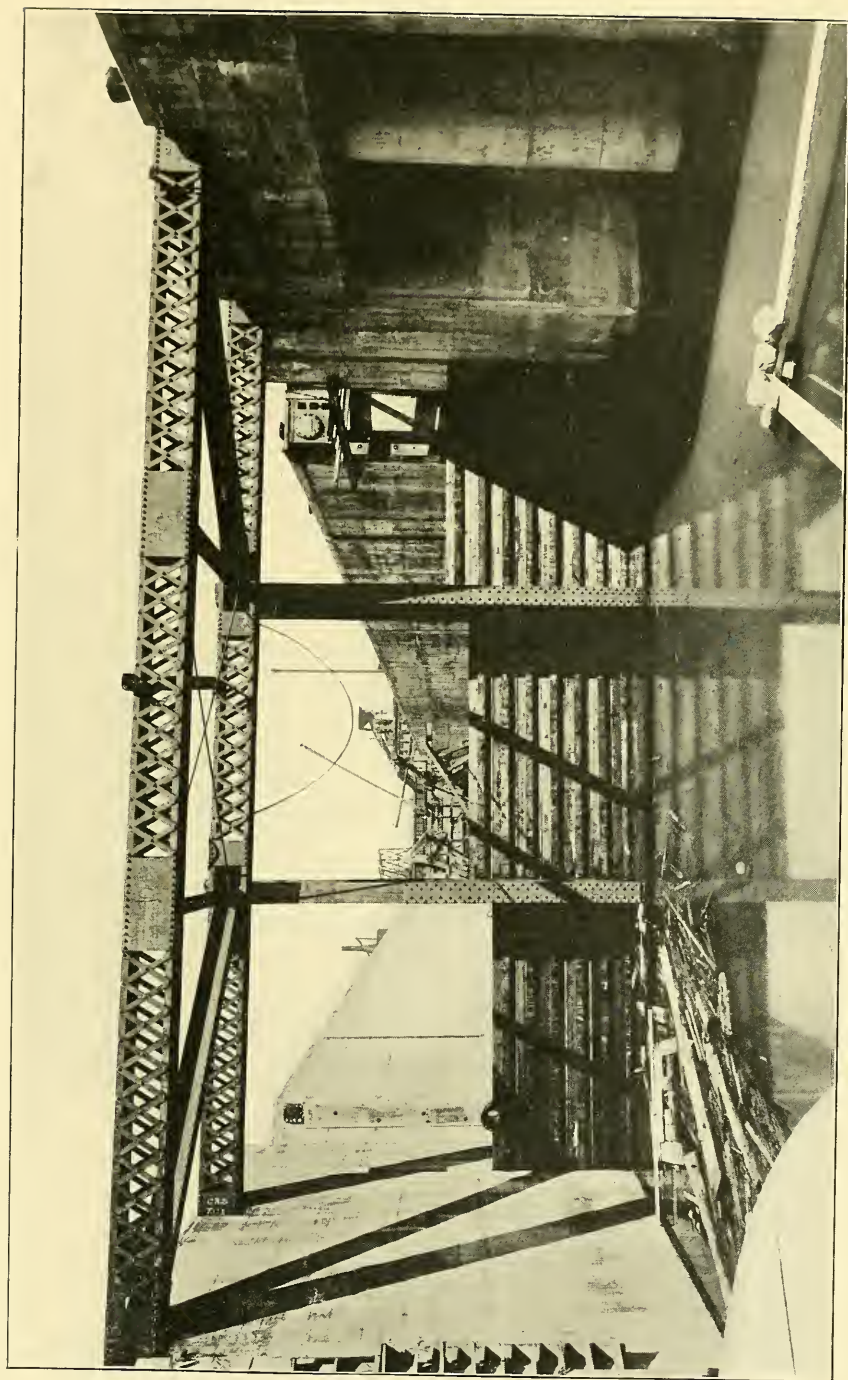
As the work of transporting the engineering parties from one place to another was too much for one launch, an arrangement was made with Mr. John E. Dwyer, naval architect, 47 Haverhill Street, Boston, to design a new boat, 28 feet long, with



7-foot beam, the machinery to consist of one 15 horse-power, make and break, Buffalo motor. When the plans for this boat were completed, bids were asked for, and on February 25 a contract was made with the Baker Yacht Basin, Incorporated, for furnishing this launch complete, with the exception of the engine and fittings, which were purchased of the Buffalo Gasolene Motor Company. The boat was completed, the engine installed and the whole ready for service on May 29. This launch was named "Lechmere," and, combined with the "Craigie," the launch previously purchased, has furnished satisfactory transportation to and from all parts of the work.

#### DAM AND LOCK.

A considerable portion of the time of the office force was devoted to the preparation of detail drawings for the Dam and Lock, some 68 drawings for this work having been made. The office force was also employed tracing and checking lock-gate operating machinery; making designs for chain supports for this machinery; designing stop-planks for the Lock and sluices; preparing studies and designs for a fender pier at the upper end of the Lock; designing the house over the lower lock-gate recess; designing temporary houses for the pump motors at the Lock and for the temporary installation of the controllers for the lock-gates and drawbridge; designing submerged salt water sluice at the upper end of the sluices; designing lubricating system for the lock-gate trucks; examining plans for the 2-inch pump submitted by the Lawrence Machine Company; designing doors and windows for the sluices, steam piping for the Lock, stems and guide brackets for miscellaneous gate valves, castings, ladders and gratings; preparing schedules of steel rods for reinforcing concrete; superintending the grinding of the lock-gate wheels and the boring of the axle-boxes of the lock-gate trucks; making calculations on the centers of gravity and the ballast required for the lock-gates; testing capstans at the Lock; designing ladders and gratings for the boiler-house, a machine for operating the small boat lock-gates, sluice-gates and operating machinery for the same, and plug drain valves for the Fens gate-chamber; preparing specifications for various contracts; indexing plans; plotting cement tests; and miscellaneous less important details.



LOCK — STOP-PLANKS AT UPPER END.



The condition of the work on the Dam and Lock at the end of the year was as follows:

The masonry for the Lock was substantially completed. The tracks for the lock-gates were laid. The lower lock-gate was nearly assembled, and the work of erection of the upper lock-gate was well advanced. The Scherzer rolling lift bridge at the lower end of the Lock was substantially completed.

At the sluices, the concrete work was substantially completed. The sluice-gates were erected, together with all their operating machinery, but the switchboards and controllers had not been installed.

#### *Coffer-dam at the Boston Side of the River.*

The coffer-dam is still being maintained, as an arrangement was made with the Boston Elevated Railway Company for the construction within it of a portion of the foundations for their piers at the lower end of the Lock, the Boston Elevated Railway Company having engaged the Holbrook, Cabot & Rollins Corporation, contractor for the Dam and Lock, to do this work.

As the larger portion of the work to be done around the Lock by the contractor for the Dam and Lock was completed, the Commission assumed the cost of pumping the Boston coffer-dam, beginning Jan. 1, 1907, and continuing until August 20, when the cost of pumping was assumed by the Boston Elevated Railway Company.

#### *Lock.*

During the winter of 1906–1907, little construction was done, owing to the extremely cold weather, which began early and continued well into the month of March. The stop-planks for temporary use at both ends of the Lock were fitted to the I-beams and placed in position as soon as the vertical steel girders and the horizontal trusses for their support were erected. Some difficulty was experienced in making the ends of the stop-plank timbers and the angles on the I-beams supporting them come in the same vertical plane, but after several trials were made with rubber gaskets and other devices, it was found that a mixture of glycerine and litharge seemed to give the most satisfactory results. In order to see if the stop-planks would be tight under water pressure, the water was allowed to rise



against the planks at the upper end of the Lock until between 5 feet and 6 feet deep, when the water found its way to the underdrain and was drawn down. By using street sweepings from the temporary bridge, it was found possible to make the planks substantially water-tight.

After some experiments with yellow pine timbers, it was decided to set cast-iron chairs for the rails for the rolling lock-gates directly in the concrete, care being taken to see that the grouting around the chairs was very carefully done.

Concrete masonry was laid at intervals during the year to complete the abutments of the drawbridge and for the foundations for the boiler house and for the manholes for the electric conduits on the east side of the Lock. A portion of the concrete bastions at the lower end of the Lock walls below the drawbridge was removed by the Boston Elevated Railway Company, in order to make room for their piers.

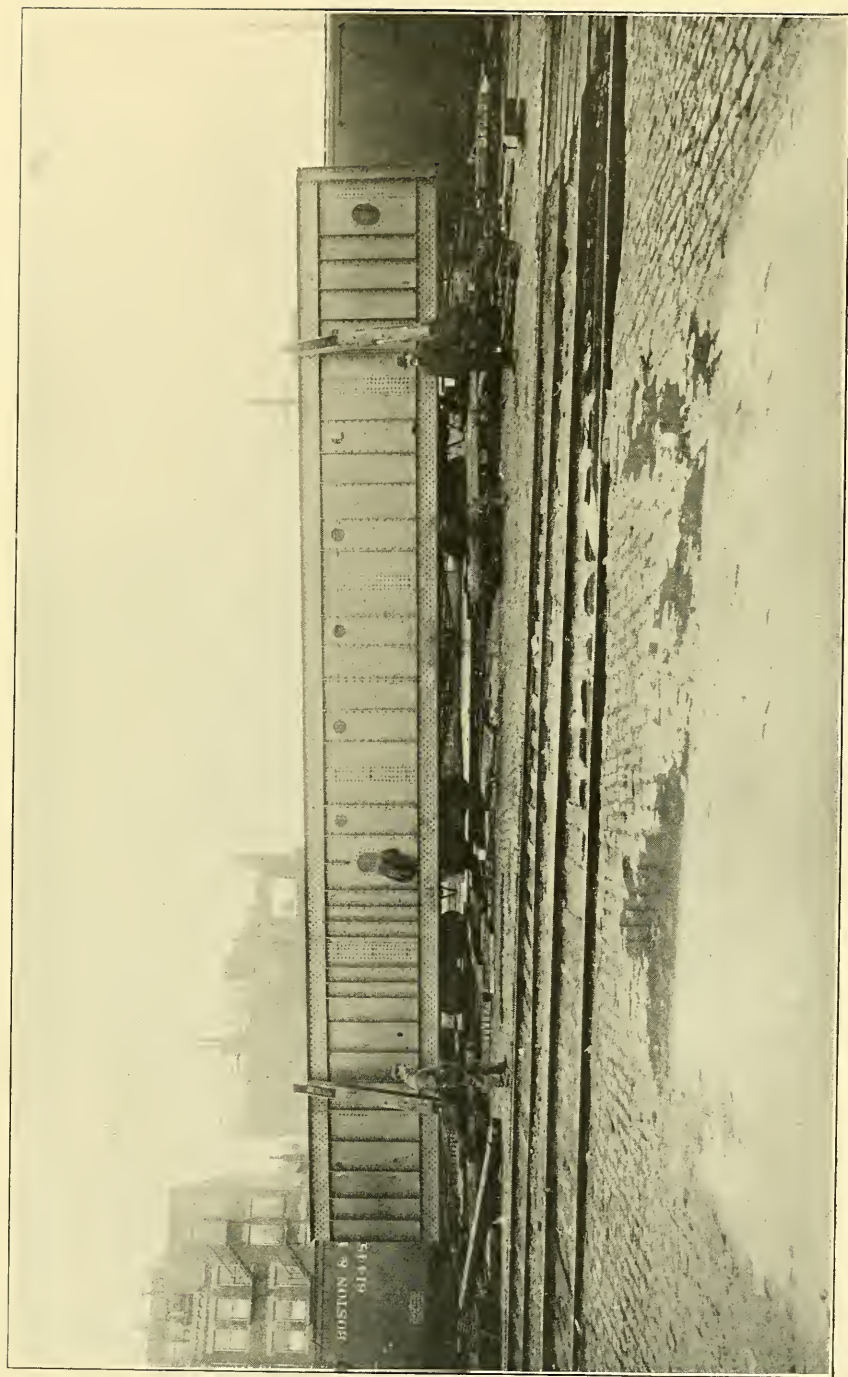
### *Lock-gates.*

Each lock-gate will be operated by two endless chains driven by electric motors with suitable gearing at the rear end of the gate recess and running over idle sprockets at the front end of the recess. These chains are attached to an equalizing beam which is connected by a steel pin to the lock-gate, so that it may be opened or shut according to the direction in which the motors are turned. Detail plans for the machinery were prepared and a contract for furnishing it made with the Link-Belt Company, of Chicago, Ill. Practically all of the material had been completed at the end of the year, but none of it had been delivered.

The chains for operating the lock-gates are so heavy that it was deemed inadvisable to use them without supports to prevent them from sagging. Designs for the columns, tracks and other structural steelwork necessary for the lock-gate operating chain supports were prepared and a contract made with the Baltimore Bridge Company, of Baltimore, Md., for furnishing the material. This material had all been delivered at the end of the year.

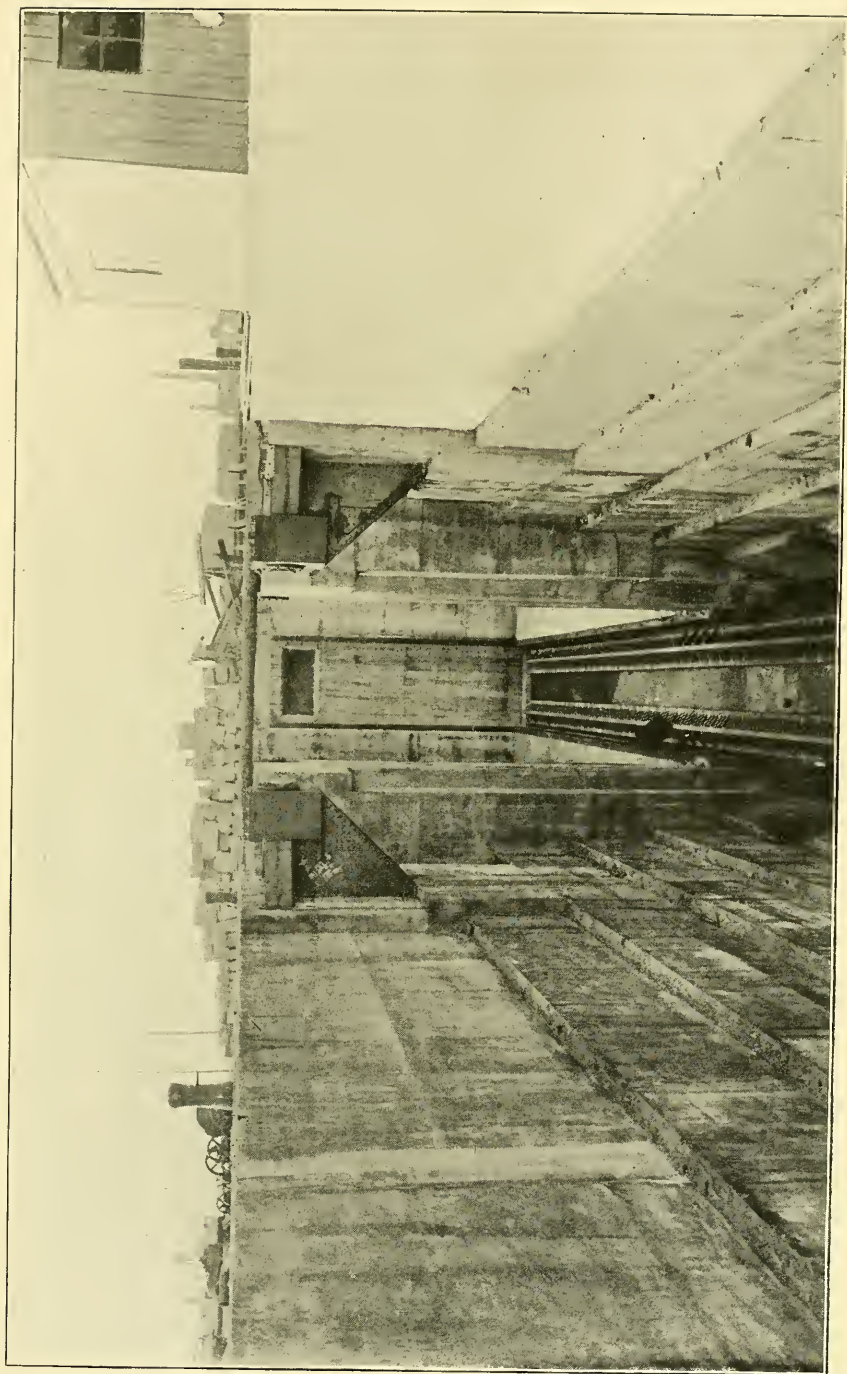
A contract for furnishing the electrical controlling devices for the lock-gate motors was made with The Cutler-Hammer





LOCK—TOP GIRDER FOR LOWER GATE.





LOCK—UPPER GATE RECESS.



Manufacturing Company, of Milwaukee, Wis., and that part of the material needed for the preliminary operation of the gates had been delivered at the end of the year.

The material for the lock-gates was received and the work of erection was well along at the end of the year. Before the girder for the top of the lower gate was put in place, the radiators manufactured by The Lumsden & Van Stone Company, of Boston, for heating the various compartments in the gates, were lowered into their respective compartments.

The thirteen sluice-gates to be used on the lock-gates for filling and emptying the Lock were delivered at the site of the work and the work of erection was commenced before the end of the year.

#### *Warping Plant.*

Two electrically operated capstans have been furnished and installed on the easterly side wall of the Lock by the American Ship Windlass Company, of Providence, R. I. These capstans will be used to expedite the progress of vessels through the Lock, so that the delay to street traffic caused by opening the drawbridge may be as slight as possible.

#### *Heating Plant.*

The radiators for heating those parts of the lock-gates upon which ice may form had been delivered upon the work at the end of the year, but they had not been put in place inside the gates.

The boilers to be furnished and erected by Lynch & Woodward were substantially completed.

#### *Superstructures.*

A large amount of time was spent during the year on studies and plans for the houses over the lock-gate recesses, and at the end of the year detail drawings for the house over the lower recess were nearing completion.

As it was necessary to install the pump-motors, controllers and other apparatus which will eventually be enclosed by these buildings, and as this apparatus had to be protected from the weather, small temporary houses were built over the pump-



motors at both gate recesses and a temporary operating tower for the controllers for the lock-gates and the drawbridge was built at the south side of the roadway just east of the drawbridge.

### *Drawbridge.*

The work of erecting the Scherzer rolling lift bridge constructed by the American Bridge Company of New York, New York, N. Y., was continued. In placing the concrete counterweights, some difficulty was experienced in getting a mixture of the required weight and density, but by the addition of pig iron the proper weights were obtained. Owing to delays in designing and erecting proper supports for the motors, neither of the leaves of the draw had been raised at the end of the year. With the exception of this and the final adjustment of the counterweights, the drawbridge was substantially completed.

### *Cambridge Cofferdam.*

The work of removing this coffer-dam was not commenced during the year, as the Boston Elevated Railway Company deemed it desirable to construct within it one pier and a portion of another and made an arrangement with the contractor for the Dam and Lock, the Holbrook, Cabot & Rollins Corporation, for doing this work.

As most of the work at the sluices which required pumping has been done for the Commission by other contractors than the Holbrook, Cabot & Rollins Corporation, who constructed and maintained the coffer-dam, the cost of pumping was paid by the Commission from Dec. 9, 1906, to Sept. 20, 1907, inclusive. From the latter date until the end of the year, the Commission paid one-half the cost of pumping, the other half being assumed by the Boston Elevated Railway Company.

### *Sluices.*

As soon as the weather permitted, work was resumed on the masonry for the lower end, and the concrete for the roof and walls and the granolithic floors was pushed rapidly by the contractor, the Holbrook, Cabot & Rollins Corporation.

In order to provide for the piers of the proposed Boston

Elevated Railway bridge on the down-stream slope of the Dam, some of the concrete at the sides of the lower end of the sluices had to be removed.

The curbstones and granolithic sidewalks were finished.

Detail plans for the sidewalk lights were not made, as it was felt that it would be better to have bidders submit designs with their proposals, but the general arrangement was shown. A contract was made with the American Luxfer Prism Company of Illinois, of Chicago, Ill., for installing the lights, and the work was nearly completed.

The gates for these sluices, the contract for the construction and erection of which was placed with the Coffin Valve Company, had been erected at the end of the year, together with their motors, stems and stands. They had all been operated with the hand operating machinery, and half of them had been operated with the electric power. A test was made of one of these gates with water at elevation 114 on one side of the gate. The motors operated successfully, requiring some five to six amperes of current at about 580 volts. At the end of the year some small amount of work in the nature of painting and adjusting remained to be done and the controller panels had not been installed.

#### *Small Boat Lock-gates.*

When the masonry of the sluices was built, heavy castings were embedded in the concrete side walls of the small boat lock. To these castings were bolted the manganese bronze hinges on which the lock-gates are to swing. These gates were installed and adjusted during the year and are ready for use.

#### *Pumps.*

The three pumps, two at the Lock and one at the sluices, to be constructed and erected by Henry R. Worthington, the contractor, were ready to be operated at the end of the year, with the exception of a few fittings. The temporary switchboards for operating the two pumps at the Lock had been installed.

## TEMPORARY BRIDGE.

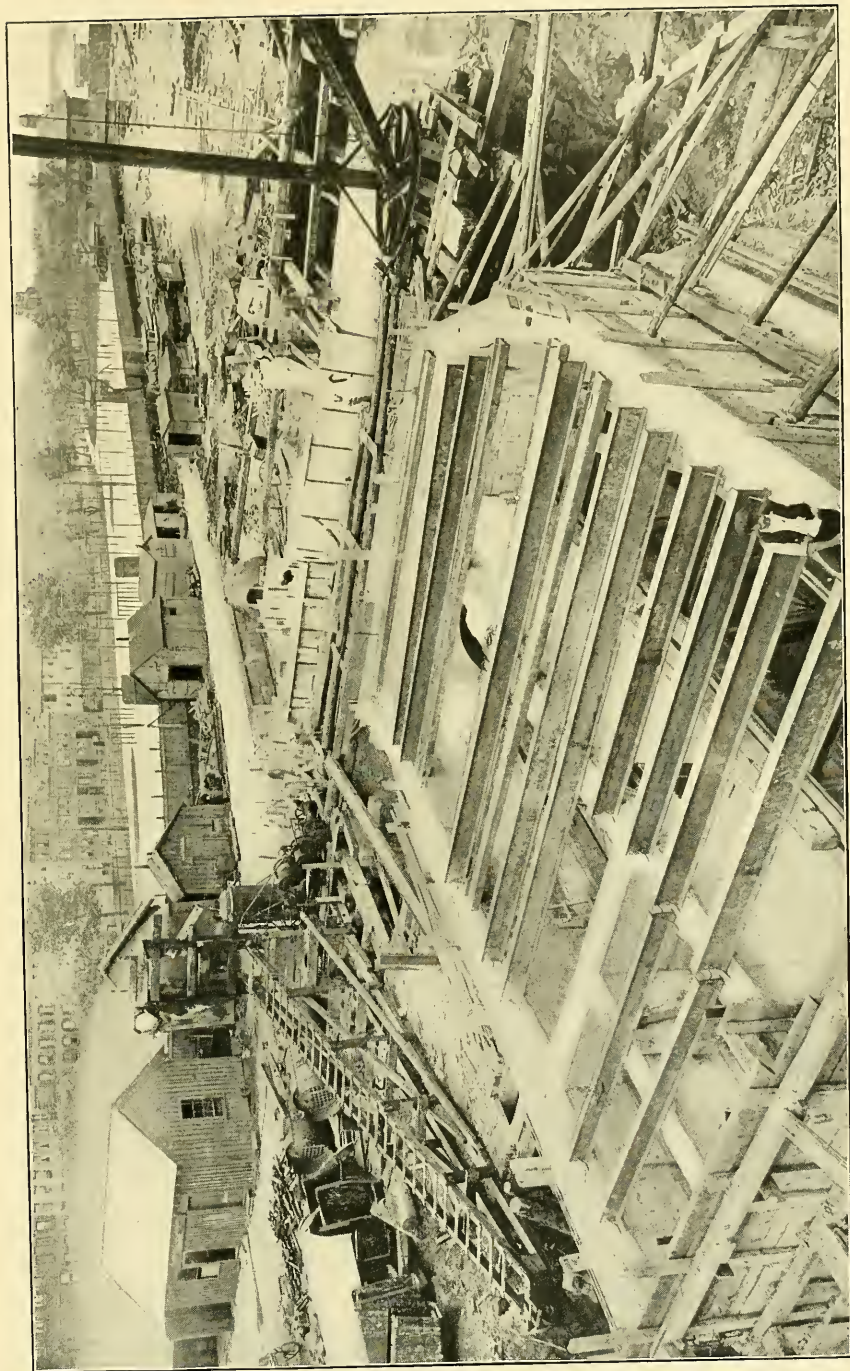
The temporary bridge and the draw in the same were maintained during the year without any serious delay either to the traffic over the bridge or to navigation through the draw. The winter of 1906-1907 was unusually severe, and some difficulty was found in operating the draw during the coldest weather, on account of the formation of ice on the draw stringers and counterweights. There were two occasions when the gates at the draw were run into and broken by cars of the Boston Elevated Railway Company, once on January 24 and again on February 23, but no person was injured in these accidents. On May 13 a team carrying a load of desks caught fire as it was crossing the bridge, and before the fire could be put out it was necessary to call out the fire department of the city of Cambridge, but the bridge itself was not damaged by the fire. One or two small fires occurred during the dry weather in July and August, but were extinguished before any serious damage was done to the bridge. New cross braces were placed on those pile bents where the old braces had been broken, 20 braces and 73 bolts  $\frac{7}{8}$  inch in diameter being put in.

## BOSTON MARGINAL CONDUIT AND BOSTON EMBANKMENT.

Plans and specifications for Section 5 of the Boston Marginal Conduit and Section 3 of the Boston Embankment were being prepared at the beginning of the period covered by this report. These sections extend from the end of Section 2 of the Boston Embankment, between Fairfield and Gloucester streets, to a point about 50 feet east of Charlesgate East. Competitive bids were not received for this work, an arrangement being made with the Holbrook, Cabot & Rollins Corporation for doing it under Contract No. 50, which originally was made for Section 4 of the Boston Marginal Conduit and Section 2 of the Boston Embankment.

Plans and specifications for the last sections of this work, to be known as Section 6 of the Boston Marginal Conduit and Section 4 of the Boston Embankment, were practically completed at the end of the year. These sections will extend from

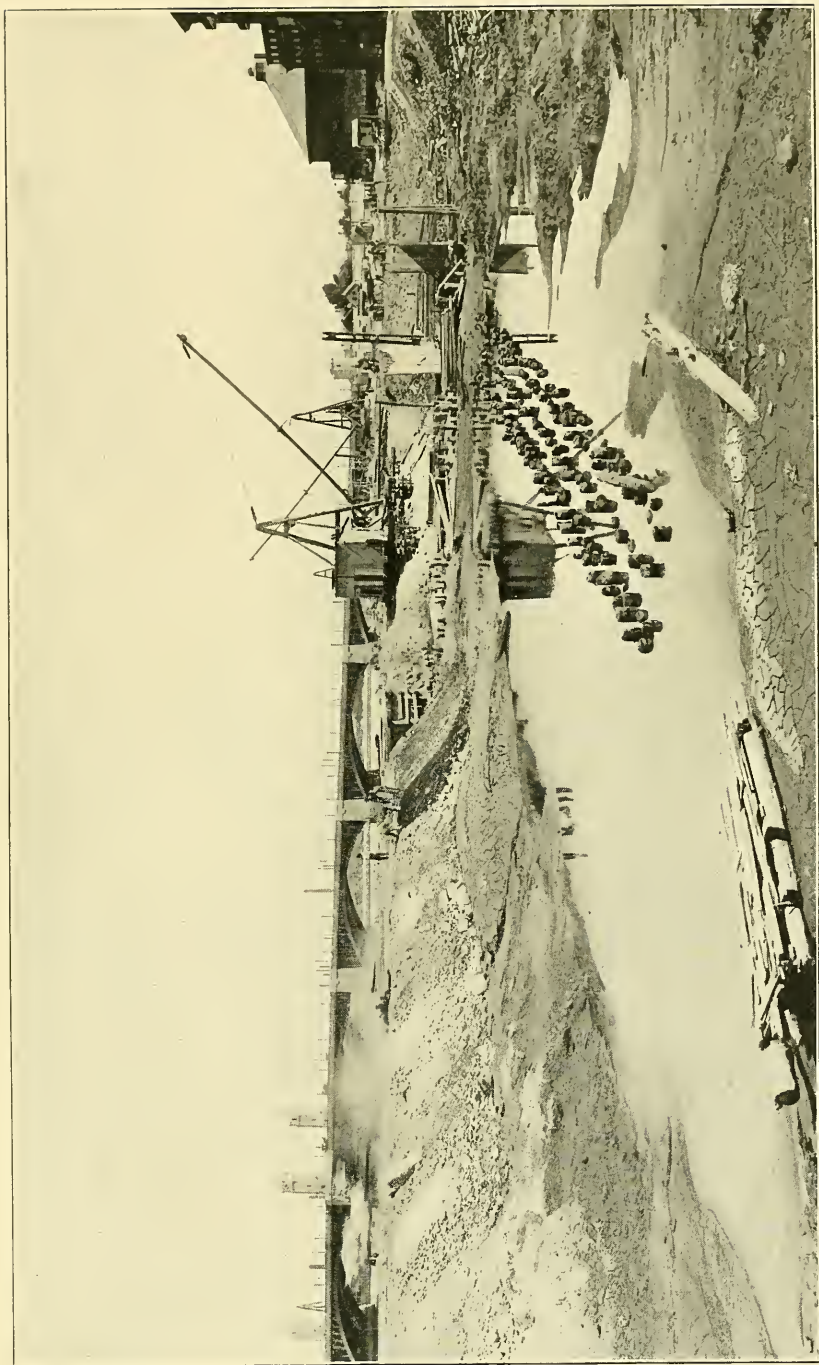




BOSTON MARGINAL CONDUIT — OUTLET CHAMBER AT DAM.

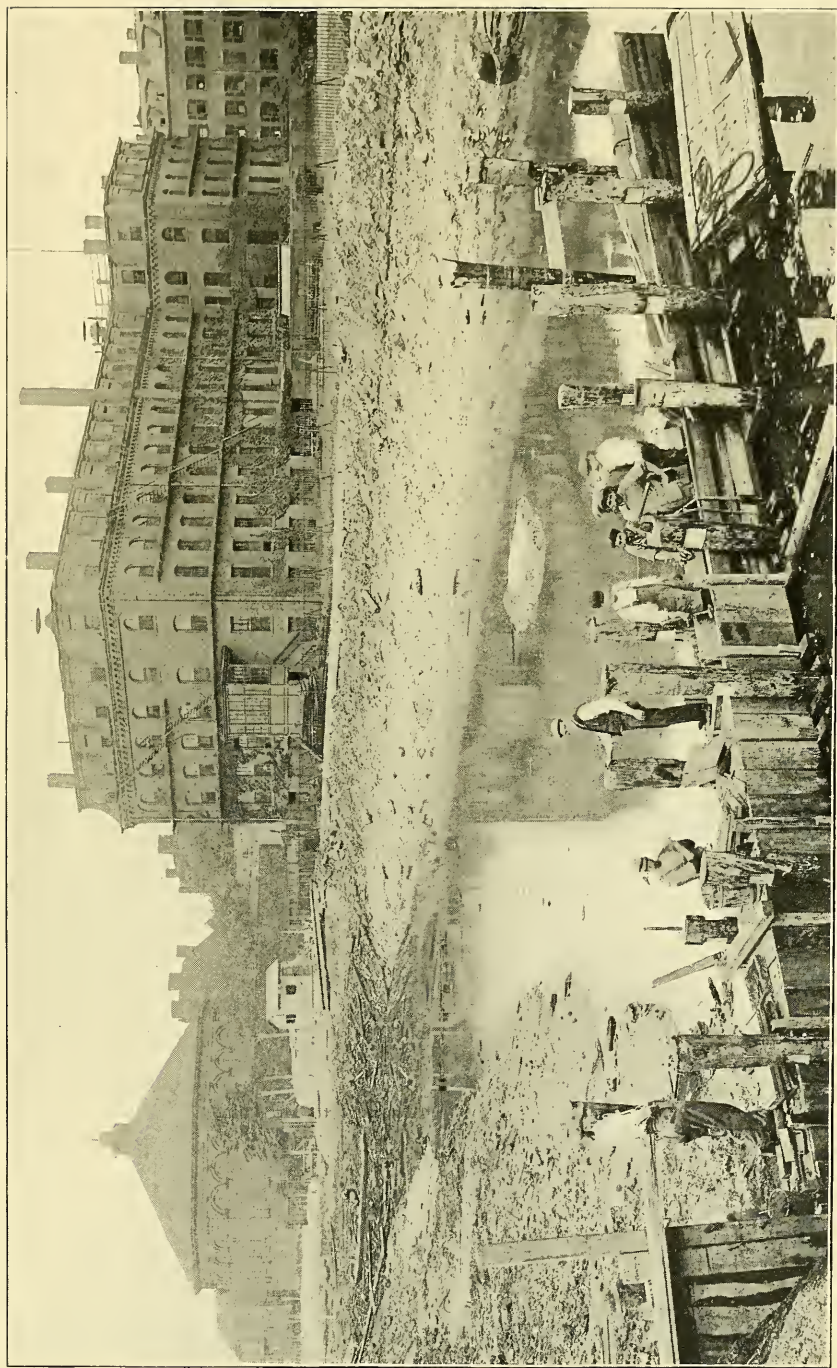






BOSTON MARGINAL CONDUIT — FOUNDATION PILES.

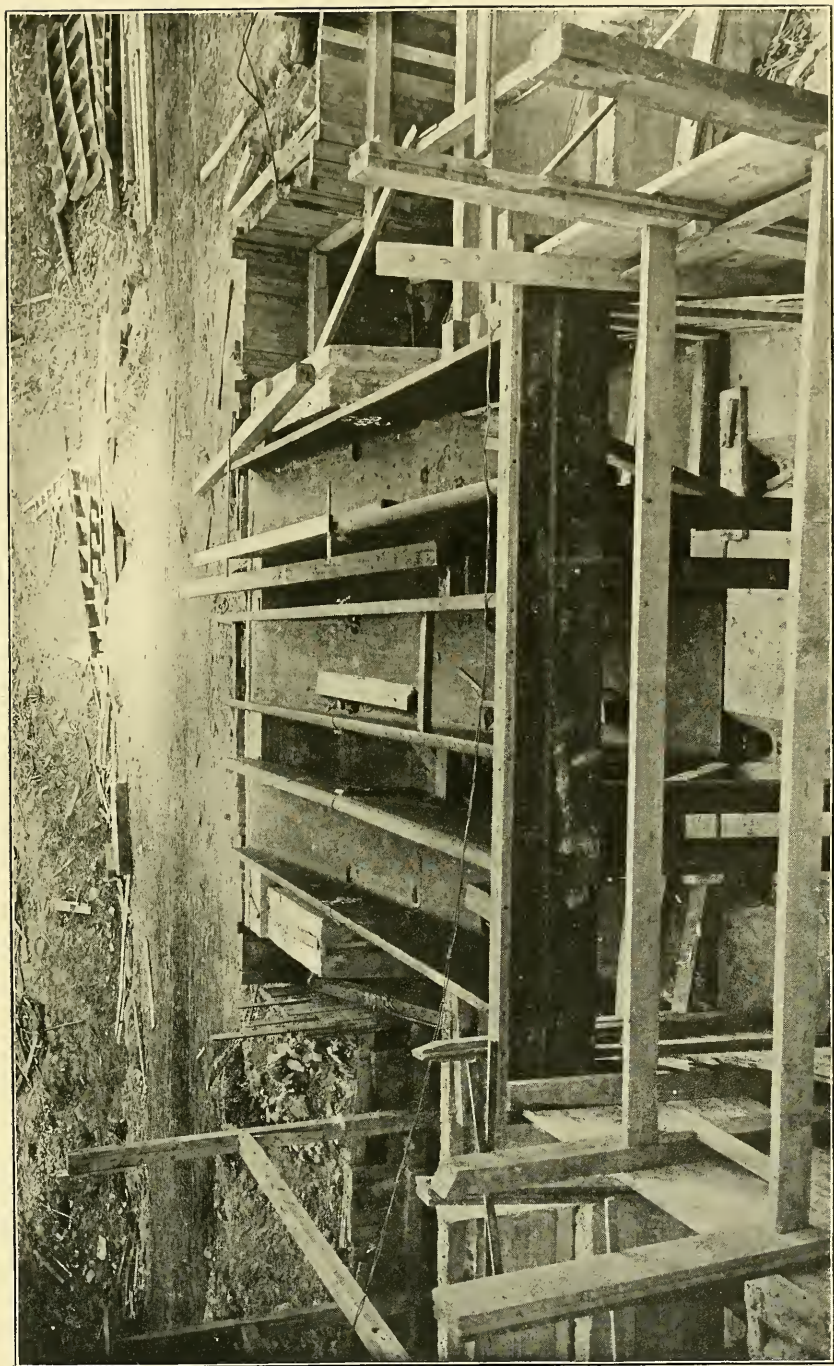




BOSTON MARGINAL CONDUIT — TEMPORARY SEWER OUTLET.







BOSTON MARGINAL CONDUIT — TROUGHS IN OVERFLOW CHAMBER.





the end of Section 3 of the embankment near Charlesgate East to the westerly line of Charlesgate West, and the contract will include the construction of the Fens gate-chamber at the junction of the Stony Brook conduits with the Boston Marginal Conduit.

A large amount of time was also spent in revising plans previously made for the Boston Marginal Conduit, on account of the relocation necessitated by the proposed Riverbank subway.

Much study was also required for the timber submerged outlets from the Boston Marginal Conduit overflows, and a design for a timber outlet was prepared, which, it is believed, will prove far more satisfactory than the cast-iron pipes which it was at first intended to use. These timber outlets are to be so built as to give a smooth interior, and as practically no iron or steel is to be used in them their life should be very long. At the end of the year specifications had not yet been prepared for building the submerged outlets from the Boston Marginal Conduit.

Studies for the treatment of the embankment in the vicinity of Harvard Bridge were made. Calculations were made on storage capacities of the Boston Marginal Conduit and Stony Brook conduits.

Section 1, the portion of the marginal conduit adjacent to the Dam, is being constructed by the Holbrook, Cabot & Rollins Corporation. During the year the contractor laid the masonry at the outlets of the conduit and for the extension of the conduit from the upper gate recess to the connection with Section 2, which was built through the Charlesbank by James Driscoll & Son under Contract No. 3.

Section 3 of the Boston Marginal Conduit and Section 1 of the Boston Embankment are being constructed by Coleman Brothers under Contract No. 44. The first section of the conduit, which extended from the new Cambridge Bridge to a point just below Revere Street, was surrounded by an earth embankment early in the year. This section was soon pumped out, and the work of excavating the trench was started.

Before the water could be entirely removed from inside the coffer-dams, it was found necessary to remove a section of the old wall and excavate a trench a short distance below the

bottom of the wall, which was then refilled with clay and gravel well packed together, this reducing the amount of pumping required to such an extent that the enclosed area was kept free from water without difficulty.

As the piles were uncovered by the excavation, it was found that in some places the earth filling had pushed them out of position. Where this movement was less than 12 or 15 inches, it was found practicable to force the piles back into place by means of screw jacks and hold them in place by braces extending from the piles to the sheeting on the side of the trench. In a few places, however, the piles were so far out of place that it was impracticable to restore them to their original position, and 62 new piles were driven to replace those that had moved. Considerable difficulty was experienced in excavating the trench, as the soft mud was forced up in the bottom of it, but by driving long sheeting, which extended a considerable distance below the bottom of the trench, and bracing across below the bottom of the masonry, it was possible to make excavations and construct the conduit, except where the embankment at the side of the sheeting was allowed to get higher on one side than on the other.

As the conduit was constructed to points opposite streets through which sewer overflows existed, concrete masonry connections were made between the conduit and the existing sewer overflow outlets. To take care of the sewer overflows until the completion of the main conduit, temporary wooden outlets on piles were built, extending from the conduit to points 10 or 15 feet beyond the line of the proposed wall. At the end of the year the conduit on this section was completed to within some 150 feet of Mt. Vernon Street, and the temporary and permanent connections made with the overflows at Pinckney and Mt. Vernon streets. All the piles required on this section for the Basin wall were driven from the lower end of the section to Berkeley Street, and the wall masonry, with the exception of the coping, was completed from the lower end of the section to Mt. Vernon Street.

Sections 4 and 5 of the Boston Marginal Conduit and sections 2 and 3 of the Boston Embankment are being constructed by the Holbrook, Cabot & Rollins Corporation under Contract

No. 50. Work under this contract was commenced with a dredge, which excavated material from the river and placed it on the embankment between Dartmouth and Clarendon streets. This work was suspended for the greater portion of February and March on account of ice in the river. Driving piles for the foundation of the Boston Marginal Conduit was commenced early in the spring. These piles were driven by a steam hammer from a floating machine fitted with extension gins and a follower, so that the piles were driven generally to within a foot of the required elevation. After the piles had been driven for several hundred feet, a machine for sawing off piles under water was fitted to the pile-driver and the piles sawed off. This saw was a steel plate 42 inches in diameter, hung from the end of a vertical shaft which was raised or lowered as the tide rose or fell, and which was revolved by a belt connecting a pulley on the vertical shaft with one on the horizontal drum of the engine.

On account of a request from the Boston Transit Commission, the location of the marginal conduit was moved 9 feet out into the river, giving a clear distance of about 40 feet between the conduit and the existing wall of Back Street. This change resulted in a loss of three rows of piles on the 350 feet where piles had already been driven.

The contractor, after building an earth embankment to elevation 114 along the river side of the proposed embankment, attempted to enclose a portion of the site of the proposed embankment some 1,100 feet in length. As soon as the tide rose higher outside than the water on the inside of the enclosure, the difference in head was sufficient to force the water around the end of the dike, through and under the old sea-wall, in such quantities that the two pumps, one 10-inch and one 12-inch, were unable to handle it, and the attempt was abandoned. In order to stop the leak around the lower end of the enclosure, a trench was excavated through a part of the old wall, but it was found so difficult to remove the stones at the bottom of the wall that a line of 6-inch yellow pine sheeting was driven to stop the flow at this point. It is probable, however, that this sheeting was split or twisted in passing through the remainder of the stones, as when another attempt

was made to pump out the enclosure, the leakage at this point did not appear to be materially diminished. It was not until the latter part of August or the first of September that this attempt was made, and it seemed a useless endeavor to get the work into condition so that any concrete masonry could be placed before cold weather. The contractor has been driving 4-inch tongued and grooved sheeting on each side of the trench for the conduit, the bottom rangers and braces for which are to be below the bottom of the concrete masonry, the sheeting below a certain grade, and the lower rangers and braces to be left in place.

The temporary wooden outlets at Dartmouth and Fairfield streets were substantially completed at the end of the year, and a beginning had been made in placing the concrete masonry for the permanent connection at Dartmouth Street.

At the end of the year the following work had been done: Piles for the Boston Marginal Conduit had been driven from the lower end of Section 4 to a point about 250 feet above Fairfield Street, and the excavation for the trench for the conduit had been completed from some 50 feet below Charlesgate East to a point about half-way between Clarendon and Berkeley streets.

#### CAMBRIDGE MARGINAL CONDUIT.

The work which is to be known as the Cambridge Marginal Conduit consists of a masonry conduit having an inside cross-section of some 25 square feet and a length of about 1,800 feet and of an inverted siphon made up of two lines of 48-inch cast-iron pipe under Lechmere Canal, the whole extending from the corner of Binney Street and Commercial Avenue to the sluices at the Dam. Stop-plank chambers are provided at both ends of the siphon, so that either pipe may be cut off and the whole flow concentrated in the other. Connection is made with the Basin at the upper end, near Binney Street, so that a flushing stream of clean water may be run through at a considerable velocity whenever necessary.

Studies, designs, plans, estimates and specifications were made for this work, including studies of the hydraulic properties of the conduit.



A contract was made with Patrick McGovern, of Boston, Mass., for building the main portion of the Cambridge Marginal Conduit, and another with Hiram W. Phillips, of Quincy, Mass., for building the inverted siphon.

Considerable difficulty was encountered by the contractor for the main portion of the conduit in driving sheeting for the gate-chambers, as the material through which it was driven in places contained many stones and boulders and the sheeting was so badly split and twisted that it was impossible to keep the water out of the enclosure except at or near low tide. Portions of the sheeting which were the most badly broken were cut off and driven down with a follower as far as possible. After this was done, the work of placing the concrete could be continued for about four hours at low water, an 8-inch pump being used.

The work on the inverted siphon during the year consisted of removing the walls on both sides of the canal and dredging a trench approximately to the grade of the siphon for the greater portion of its length. Sheet piling was also driven on the south side of Lechmere Canal on both sides of the trench where it passes through the old sea-wall, and a few piles for supporting the pipes were driven.

#### DREDGING AND PILE-DRIVING IN THE BASIN.

Some 20,000 cubic yards were dredged from the Basin under Contract No. 1, with the Holbrook, Cabot & Rollins Corporation, partly on the Cambridge side of the Basin and partly on the Boston side near the Dam, of which 8,000 cubic yards were deposited in the Boston Embankment and the remainder was deposited in storage piles below the new Cambridge Bridge.

The number of piles driven in the Basin by the Holbrook, Cabot & Rollins Corporation under Contract No. 23 was 146. At the end of the year oak piling had been driven in front of 918 linear feet of walls and wharves in the Basin.

#### BROAD AND LECHMERE CANALS.

The work of dredging was continued by the Holbrook, Cabot & Rollins Corporation under Contract No. 1. Some 48,000 cubic yards were dredged from Broad Canal and 6,000 cubic

yards from Lechmere Canal. Of this material, about 32,000 cubic yards were deposited in the Boston Embankment, about 5,000 cubic yards were deposited in the Dam, and the remainder was deposited in storage piles below the new Cambridge Bridge.

The driving and capping of piles in front of properties on Broad and Lechmere canals by the Holbrook, Cabot & Rollins Corporation under Contract No. 23 was continued at various times, and at the end of the year the piles had been driven in front of all the properties in Broad Canal, except the Tower property and the portion of the property of the Geo. G. Page Box Company above the railroad bridge, making a total of 5,710 linear feet of walls and wharves in front of which oak piles had been driven in Broad Canal. The piles in Lechmere Canal were all driven, except on a portion of the Peters estate and on that portion of the Scully property on the south side of the canal and west of Commercial Avenue where a location for the bulkhead line has not been settled, making a total of 3,036 linear feet of walls and wharves in front of which oak piles had been driven in Lechmere Canal.

The work of lowering the inverted sewer siphon under Lechmere Canal in Commercial Avenue was performed by Hiram W. Phillips, of Quincy, Mass. Before commencing the work, the flow of the sewer was diverted through the Bridge Street sewer and discharged directly into the river, between the old sea-wall and the Cambridge coffer-dam. Before interfering with the existing siphon, a test was made of the amount of leakage into the siphon at high water when it was pumped out. This was found to be at the rate of about one cubic foot per minute. While dredging was in progress to uncover the existing siphon, two portions of the wall on the northerly side of the canal fell in. One section, immediately adjoining the Wellington-Wild coal wharf, was about 20 feet in length; the other, near the easterly side of Commercial Avenue, was about 30 feet in length. Dredging at this point was then suspended, and a line of 4-inch splined sheet-piling was driven, extending from the line of the Wellington-Wild coal wharf to the sheeting for the old siphon, and the foundation stones of the wall at the corner of the Wellington-Wild coal wharf were relaid and

the joints filled with spawls and pinners driven tightly into place. After the dredging was completed, the pipes at the ends of the siphon were cut. Slings were passed under the siphon box and the box was raised and towed to the up-stream slope of the Cambridge coffer-dam, where the ends were cut off and made the proper length for the new siphon. While this was being done, the trench was dredged to the required grade of the new siphon, the siphon was lowered, and connections at the end made. A test showed that the leakage was greater than before the work was started. It was only with great difficulty that the leak was found and stopped, when another test showed the leakage to be about one-half the amount of the leakage in the original siphon.

#### LAND TAKINGS.

For the right to drive piles and to dredge in the canals in front of properties whose owners had not signed releases, the following taking plans were made:—

Plan of land of Annie B. Matthews and Sarah M. Fay on Broad Canal, between Third and Sixth streets.

Plan of land of heirs of Howard Coon on Broad Canal, between First and Third streets.

Plan of land of Walter J. Connery and Walter A. Wentworth on Broad Canal, between Third and Sixth streets.

Plan of land of the Sylvester Tower Company on Broad Canal, above Sixth Street.

Plan of land of Mary A. Linehan on Lechmere Canal, about 200 feet west of Commercial Avenue.

For the right to construct the marginal conduit through a corner of the property, a taking plan was made of land of the Massachusetts Charitable Eye and Ear Infirmary adjacent to the old sea-wall of the Charles River adjoining the new Cambridge Bridge.

#### BORINGS.

In December arrangements were made with the Charles R. Gow Company for making a few borings by day labor on the location of the proposed rest pier at the upper end of the Lock, and four borings were made to a net depth of 68.6 linear feet.

In January an agreement was made with the Charles R. Gow Company for making borings from a scow in the river near the proposed outlets from the Cambridge and the Boston marginal conduits at the rate of \$1.00 per linear foot. Under this agreement fourteen borings were made to a depth of 453.5 linear feet.

In April an agreement was made with B. F. Smith & Brother for making borings on the line of the Cambridge Marginal Conduit at the rate of \$0.40 per linear foot. Under this agreement thirteen borings were made to a total depth of 405 $\frac{1}{4}$  linear feet.

#### UPLAND FLOW OF THE CHARLES RIVER.

A recording gage, showing the depth of water flowing over the dam at the Waltham Bleachery, was maintained, and weekly current meter observations were taken of the flow in the canal past the Bleachery Dam.

Table No. 1 shows the estimated average flow of the Charles River at the Waltham Bleachery for weekly periods. The area of the watershed above the Waltham Bleachery is taken to be 169 square miles; this excludes 70 square miles assumed to be tributary to Mother Brook and 24 square miles tributary to the Cambridge reservoirs. Whenever these reservoirs overflowed into the Charles, the amount, as furnished by Mr. L. M. Hastings, city engineer of Cambridge, has been deducted from the total discharge measured at the Waltham Bleachery.

Table No. 2 shows the number of days during the year ending Nov. 30, 1907, when the upland flow of the Charles River at the site of the Dam, estimated from the records kept by the Charles River Basin Commission at the Waltham Bleachery, was more than 500 cubic feet per second for twenty-four hours.

Table No. 3 shows the length of time during which the water in the Harbor under normal tide conditions will be higher than the water in the Basin, and the rise of the Basin during that interval for various rates of upland flow.

Diagram No. 1 shows the daily flow of the Charles River at the Waltham Bleachery, in connection with the rainfall at Chestnut Hill, taken from the records of the Metropolitan Water Works.

TABLE NO. 1.—*Estimated Weekly Average Flow of Charles River at the Waltham Bleachery for the Year ending Nov. 30, 1907.*

WEEK ENDING—	Cubic Feet per Second.	Cubic Feet per Second per Square Mile. <sup>1</sup>	WEEK ENDING—	Cubic Feet per Second.	Cubic Feet per Second per Square Mile. <sup>1</sup>
<b>1906.</b>			<b>1907.</b>		
Dec. 8, . . .	193	1.14	June 8, . . .	292	1.73
15, . . .	180	1.06	15, . . .	255	1.51
22, . . .	105	0.62	22, . . .	164	0.97
29, . . .	145	0.86	29, . . .	122	0.72
<b>1907.</b>			July 6, . . .	83	0.49
Jan. 5, . . .	311	1.84	13, . . .	41	0.24
12, . . .	487	2.88	20, . . .	44	0.26
19, . . .	421	2.49	27, . . .	43	0.25
26, . . .	406	2.40	Aug. 3, . . .	43	0.25
Feb. 2, . . .	390	2.31	10, . . .	29	0.17
9, . . .	231	1.37	17, . . .	24	0.14
16, . . .	205	1.21	24, . . .	22	0.13
23, . . .	205	1.21	31, . . .	19	0.11
Mar. 2, . . .	141	0.83	Sept. 7, . . .	15	0.09
9, . . .	181	1.07	14, . . .	30	0.18
16, . . .	190	1.12	21, . . .	49	0.29
23, . . .	547	3.24	28, . . .	60	0.36
30, . . .	586	3.47	Oct. 5, . . .	135	0.80
Apr. 6, . . .	420	2.49	12, . . .	222	1.31
13, . . .	419	2.48	19, . . .	147	0.87
20, . . .	498	2.95	26, . . .	101	0.60
27, . . .	403	2.38	Nov. 2, . . .	96	0.57
May 4, . . .	300	1.78	9, . . .	249	1.47
11, . . .	256	1.51	16, . . .	398	2.36
18, . . .	317	1.88	23, . . .	274	1.62
25, . . .	276	1.63	30, . . .	376	2.23
June 1, . . .	215	1.27			

<sup>1</sup> Area of watershed is 169 square miles.



TABLE NO. 2.—*Number of Days during Year ending Nov. 30, 1907, when Estimated Upland Flow of Charles River at the Site of the Dam was More than 500 Cubic Feet per Second for Twenty-four Hours, from Records kept by the Charles River Basin Commission at the Waltham Bleachery.*

MONTH.	500-750 Cubic Feet per Second (Days).	750-1,000 Cubic Feet per Second (Days).	1,000-1,500 Cubic Feet per Second (Days).	1,500-2,000 Cubic Feet per Second (Days).	2,000-2,500 Cubic Feet per Second (Days).	Total Number of Days exceeding 500 Cubic Feet per Second.	Rainfall at Chestnut Hill (Inches).	Average Rainfall on Sudbury Watershed for Thirty-two Years (Inches).
<b>1906.</b>								
December, . . .	-	-	-	-	-	-	5.36	3.84
<b>1907.</b>								
January, . . .	20	1	-	-	-	21	3.80	4.19
February, . . .	1	-	-	-	-	1	3.31	4.22
March, . . .	4	10	-	-	-	14	2.44	4.60
April, . . .	19	3	-	-	-	22	3.72	3.56
May, . . .	-	-	-	-	-	-	4.06	3.35
June, . . .	-	-	-	-	-	-	3.39	3.17
July, . . .	-	-	-	-	-	-	1.49	3.72
August, . . .	-	-	-	-	-	-	1.79	3.98
September, . . .	-	-	-	-	-	-	10.02	3.43
October, . . .	-	-	-	-	-	-	3.65	4.12
November, . . .	10	-	-	-	-	10	7.91	3.86
Totals, . . .	54	14	-	-	-	68	50.94	46.04
1905-06, <sup>1</sup> . . .	29	26	-	-	-	55	50.11	-
1904-05, <sup>2</sup> . . .	21	25	5	-	-	51	39.10	-
1903-04, <sup>2</sup> . . .	29	18	13	5	1	66	45.98	-

The estimated flow at the site of the Dam was obtained from that at the Waltham Bleachery by applying the yield per square mile given in Table No. 1 and adding the waste from the Cambridge reservoirs watershed as obtained from the records kept by the city of Cambridge.

<sup>1</sup> 14 months.<sup>2</sup> One year.

TABLE NO. 3. — *Time during which the Water in the Harbor under Normal Tide Conditions will be Above the Water in the Basin, and Rise of Basin during that Interval for Various Rates of Upland Flow.*

Rate of Upland Flow (Cubic Feet per Second).	Time Harbor will be Above Basin.		Rise of Basin (Feet).	Rate of Upland Flow (Cubic Feet per Second).	Time Harbor will be Above Basin.		Rise of Basin (Feet).
	Hrs.	Min.			Hrs.	Min.	
500	3	48	.20	3,000	3	19	1.02
1,000	3	42	.39	4,000	3	8	1.28
1,500	3	36	.56	5,000	2	58	1.51
2,000	3	30	.72	6,000	2	49	1.71
2,500	3	25	.87				

#### TRAFFIC THROUGH DRAW OF CRAIGIE BRIDGE AND OF TEMPORARY BRIDGE.

A record has been kept of the traffic through the draw of the temporary bridge. This record gives the tonnage, draft and time of passage of vessels of different kinds. Some of the results of the records obtained are shown by the following diagrams: —

Diagram No. 2 shows weekly totals of cargoes, in tons, not including the material furnished for the Charles River Dam, passing through the temporary bridge for the year ending Nov. 30, 1907.

Diagram No. 3 shows the monthly totals of cargoes, in tons, not including the material furnished for the Charles River Dam, passing through Craigie Bridge or the temporary bridge since Nov. 30, 1899. This diagram indicates a general tendency of the tonnage to decrease from year to year.

Diagram No. 4 shows the yearly number of vessels passing through Craigie Bridge or the temporary bridge since Sept. 30, 1885, and the number of times the draw has been opened per year since Sept. 30, 1871, the only complete years covered by existing records.

## MISCELLANEOUS ENGINEERING WORK.

One hundred and thirty-eight finished plans were made during the year, in addition to a large number of studies and sketches. One hundred and ninety-nine plans were indexed and filed, which, with the plans previously filed, make a total of 895 plans.

One hundred and forty-five photographs were taken by Mr. Luther H. Shattuck.

Observations were taken of the elevation to which sewer overflows rise at times of high water, and the usual miscellaneous work of soundings and surveys was done.

## CONTRACTS.

Thirty-three contracts were made during the year. The preparation of the various contract plans, specifications and estimates, supervision of the work, etc., occupied a considerable portion of the time of the engineering force. A detailed statement of the contracts made and pending during the year is given in Appendix B.

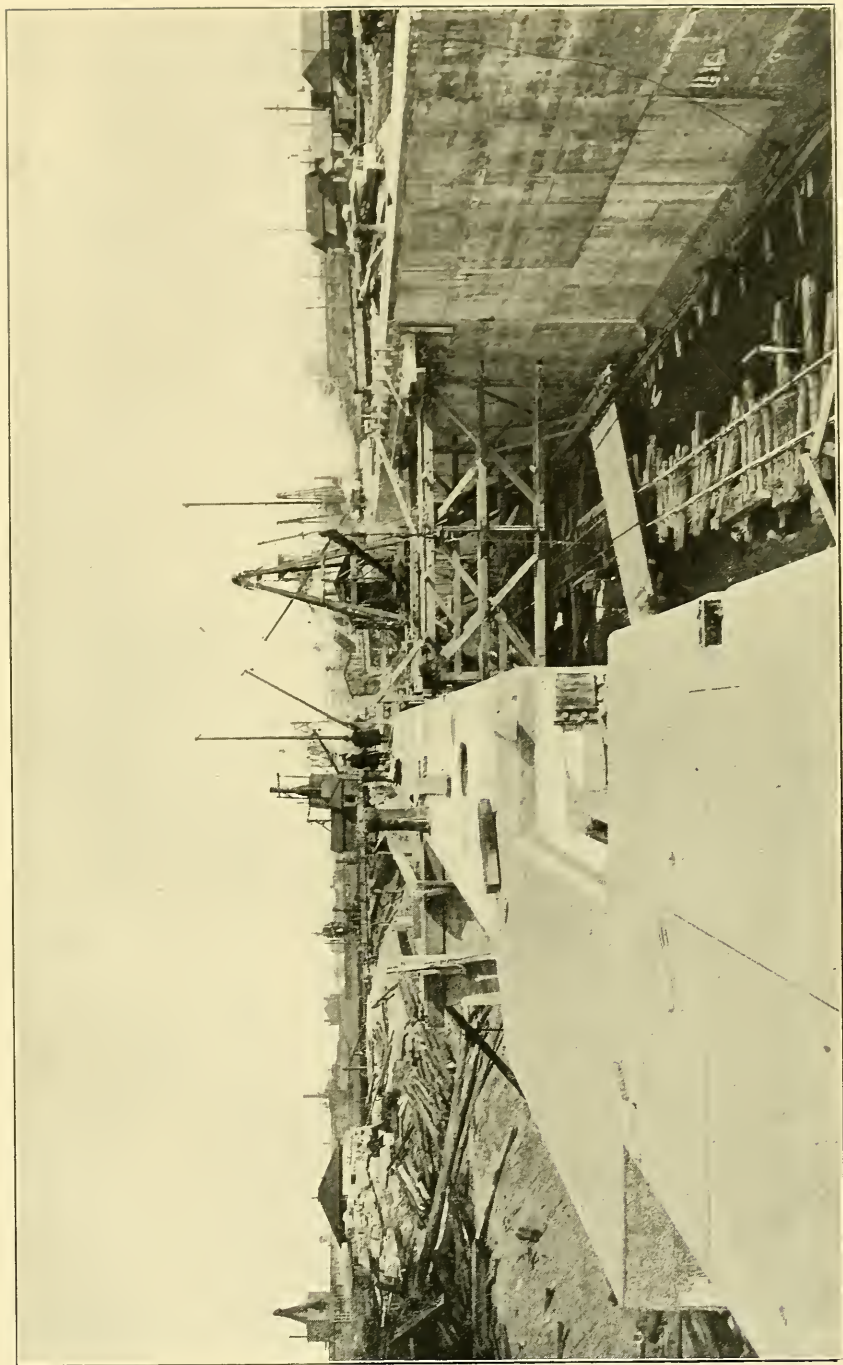
Following are additional descriptions of some of these contracts, except so far as the work done under them has already been described under the headings of "Dam and Lock," "Boston Marginal Conduit and Boston Embankment," "Cambridge Marginal Conduit," "Dredging and Pile-driving in the Basin" and "Broad and Lechmere Canals."

*Contract No. 1, Holbrook, Cabot & Rollins Corporation. — Dam and Lock in the Charles River, Boston and Cambridge.*

On Jan. 14, 1905, a contract was made with the Holbrook, Cabot & Rollins Corporation for the construction of the Dam and Lock. A general description of the work to be done under this contract is given in the report for the year ending Sept. 30, 1905.

The following is a summary of the work of the current year: —

On April 12 all the stop-planks were in place at the upper end, and on May 21 all were in place at the lower end, of the Lock.



LOCK — Looking North.





On March 1 the driving of piles for the Harbor wall between the Lock and the Boston Marginal Conduit was resumed.

On March 22 concrete work was started again with the mixer in a new location, just below the Harbor wall and about half-way between the Lock and the Boston Marginal Conduit.

The work of drilling holes preliminary to cutting off concrete at the lower end of the Lock, made necessary by the location of the Boston Elevated Railway, was started on July 30.

Work at the sluices was resumed on April 11, and the principal work on the sluices was completed about the first of August, very little work being done there during the year after that date.

The total value of the work performed, as shown by the November, 1907, estimate, was \$581,978.53, the principal items of which were as follows:—

Coffer-dam at the Boston end, . . . . .	90 per cent. completed. <sup>1</sup>
Coffer-dam at the Cambridge end, . . . . .	90 per cent. completed. <sup>1</sup>
Earth excavation, . . . . .	375,326 cu. yds.
Round piles in place (exclusive of coffer-dams), . . . . .	306,500 lin. ft.
Spruce lumber in place, . . . . .	139.67 M. ft. B. M.
Concrete masonry, . . . . .	36,320 cu. yds.
Granolithic surfacing, . . . . .	1,240 sq. yds.
Ashlar masonry, . . . . .	348 cu. yds.
Dimension stone masonry, . . . . .	135 cu. yds.
Face dressing, . . . . .	5,600 sq. ft.
Iron and other metal work placed, . . . . .	706.283 tons.
Special work, . . . . .	\$14,062.97
Extra work, . . . . .	64,904.28

*Contract No. 2, United States Wood Preserving Company. —  
Wooden Block Paving for Temporary Bridge, Boston and  
Cambridge.*

On March 23, 1905, a contract was made with the United States Wood Preserving Company for furnishing and laying the wooden block paving for the temporary bridge.

No additional work was done under this contract during the year, and a final estimate was made with the contractor under date of April 26, 1907, for \$750, making the total amount paid on the contract \$5,532.52.

<sup>1</sup> Assumed not completed until removed.

*Contract No. 5, Henry R. Worthington. — Furnishing and erecting Pumps, Boston and Cambridge.*

On Sept. 30, 1905, a contract was made with Henry R. Worthington for furnishing and erecting pumps. A description of the work called for under this contract is given in the report for the year ending Sept. 30, 1905.

The three pumps called for under this contract had all been erected but had not been tested at the end of the year.

The total amount paid to the end of the year was \$7,626.40.

*Contract No. 23, Holbrook, Cabot & Rollins Corporation. — Furnishing, driving and capping Piles, Cambridge.*

On Dec. 4, 1905, a contract was made with the Holbrook, Cabot & Rollins Corporation for piles along the walls of the canals and Basin in Cambridge.

Work on this contract was substantially completed at the end of the year.

The value of the work done, as shown by the November, 1907, estimate, was \$74,768.15. The principal items of work performed were as follows:—

Oak piles in place, . . . . .	4,400.
Long-leaf yellow pine in place, . . . . .	113.7 M. ft. B. M.
Iron or steel in place, . . . . .	88,266 pounds.
Extra work, . . . . .	\$4,002.47

*Contract No. 24, American Bridge Company of New York. — Constructing a Scherzer Rolling Lift Bridge, Boston.*

On March 5, 1906, bids were received for the construction of a Scherzer rolling lift bridge, and on March 16, 1906, a contract was made with the American Bridge Company of New York for the construction of this bridge for \$40,800.

On Feb. 1, 1907, the work of erecting the drawbridge was started, and the erection of the steel was nearly finished by April 1. At the end of the year, the machinery was in place and the bridge substantially completed.

The value of the work done at the end of the year, as shown by the October, 1907, estimate, was \$35,000.

*Contract No. 25, Coffin Valve Company. — Furnishing Sluice-gates at the Sluices in the Dam, Cambridge.*

On March 16, 1906, a contract was made with the Coffin Valve Company for the large gates for the sluices, for the sum of \$24,800.

With the exception of the electrical controlling apparatus, this work was nearly completed at the end of the year.

The value of the work done at the end of the year, as shown by the November, 1907, estimate, was \$21,200.

*Contract No. 27, Coffin Valve Company. — Furnishing Sluice-gates on the Lock-gates in the Lock, Boston.*

On March 6, 1906, a contract was made with the Coffin Valve Company for furnishing the sluice-gates on the lock-gates at the Lock, for the sum of \$17,093.

The erection work on these gates was commenced on November 8 and was continued until the end of the year. The value of the work done at that date was, as shown by the March, 1907, estimate, \$5,810, no additional material having been delivered between the date of that estimate and the end of the year.

*Contract No. 28, Coffin Valve Company. — Furnishing Tide-gates at the Dam and Lock, Boston and Cambridge.*

On March 16, 1906, a contract was made with the Coffin Valve Company for furnishing and erecting twenty-five tide-gates at the Dam and Lock, the contract price for the gates being \$4,438.

The gates called for under this contract had all been erected at the end of the year. The amount paid on this contract, as shown by the January, 1907, estimate, was \$3,772.30, the work, with the exception of the final adjustment of the tide-gates, having been substantially completed at that date.

*Contract No. 30, New Jersey-West Virginia Bridge Company. — Constructing Lock-gates, Boston.*

On May 14, 1906, bids were opened for the construction of the rolling lock-gates in the Lock, and on June 13, 1906, a contract was made with the New Jersey-West Virginia Bridge Company for this work, the price to be \$26,784.

On Oct. 1, 1907, a derrick was erected for handling the material for the lower lock-gate. On November 21 the derrick was removed from the lower to the upper gate recess, for the purpose of erecting the upper lock-gate.

At the end of the year the work of erecting and riveting the gates was in progress. The value of the work done at that date, as shown by the November, 1907, estimate, was \$18,000.

*Contract No. 37, American Ship Windlass Company. — Furnishing and erecting Electric Dock Capstans at Lock, Boston.*

On May 24, 1906, a contract was made with the American Ship Windlass Company for two capstans for warping vessels through the Lock, for the sum of \$2,100.

On March 8, 1907, an estimate for 75 per cent. of the contract price, amounting to \$1,575, was made, this work being substantially completed, with the exception of erecting and testing the capstans.

The two capstans called for under this contract were received Aug. 31, 1907, and on September 20 the capstans had been erected and the local wiring completed. On October 14 a test was made to determine whether they complied with the specifications of the contract.

*Contract No. 38, Westinghouse Electric and Manufacturing Company. — Furnishing Motors for operating Lock-gates, Boston.*

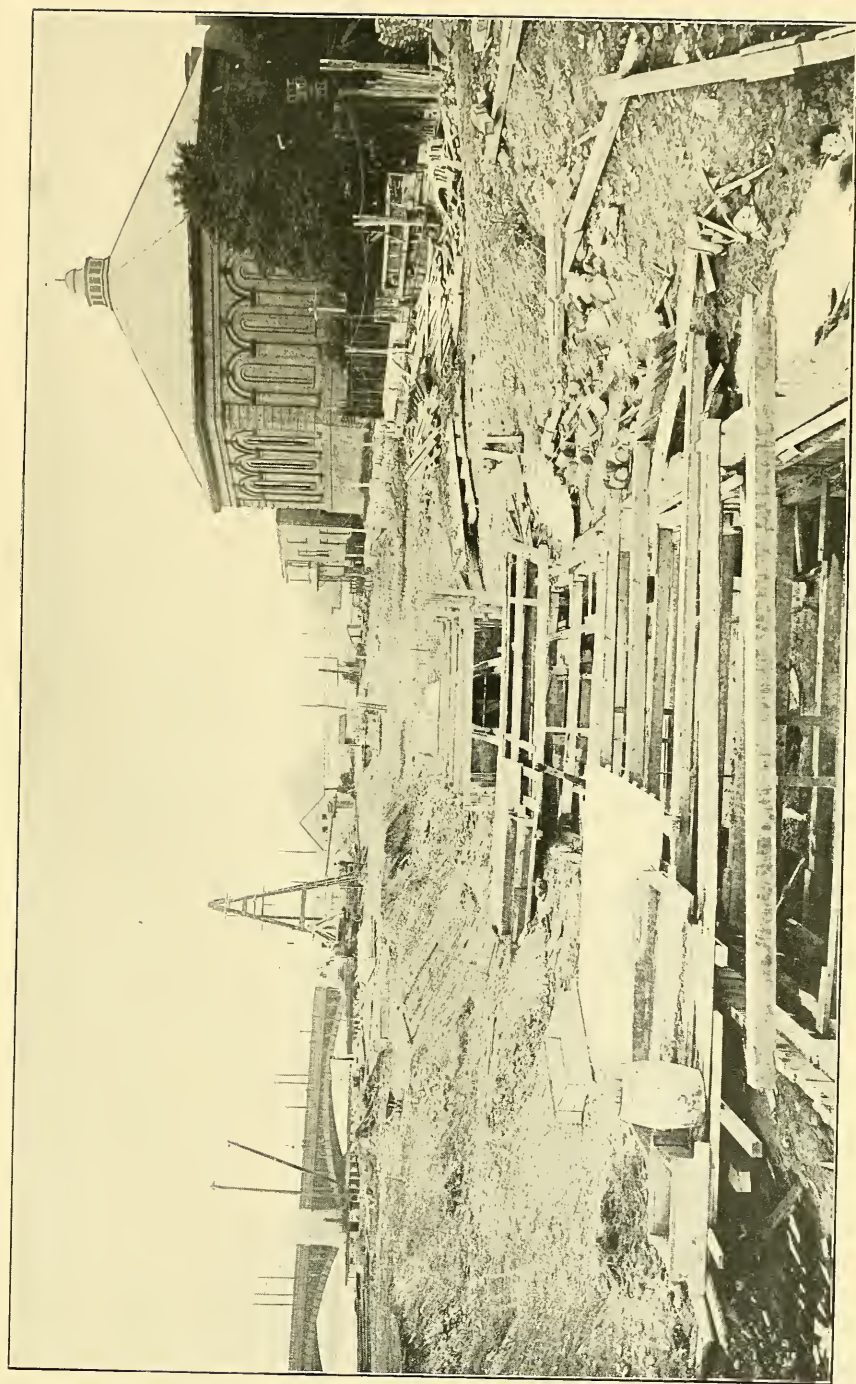
On May 25, 1906, a contract was made with the Westinghouse Electric and Manufacturing Company for four motors, for the sum of \$2,635.40.

Two of the motors were delivered Jan. 8, 1907, and the other two Feb. 16, 1907. A voucher for the final payment was approved Feb. 25, 1907.

*Contract No. 41, Coffin Valve Company. — Furnishing Sluice-gates at the Sluices and Boston Marginal Conduit, Cambridge and Boston.*

On June 14, 1906, a contract was made with the Coffin Valve Company for six sluice-gates at the Dam and Lock, for the sum of \$11,862.





BOSTON MARGINAL CONDUIT—VIEW NEAR REVERE STREET, SHOWING TRENCH.





These gates, with their appurtenances, with the exception of a portion of the operating machinery and electrical control, were delivered.

The value of the work done, as shown by the October, 1907, estimate, was \$9,007.

*Contract No. 44, Coleman Brothers. — Section 3 of the Boston Marginal Conduit and Section 1 of the Boston Embankment, Boston.*

On Sept. 24, 1906, a contract was made with Coleman Brothers for this work.

The work of filling continued without much interruption during the winter of 1906–1907.

On March 20, 1907, the work of placing the concrete masonry, which had been discontinued during the winter, was resumed.

The first section was completely surrounded by an earth dam on April 8. This area was pumped out on April 9. The second area, extending to a point a short distance below Pinckney Street, was pumped out on June 22; the third area, extending to a point near Mt. Vernon Street, on August 10; and the fourth area, extending nearly to Berkeley Street, on November 4.

In November, 1906, eight piles were driven for the Basin wall, but as they moved out of position, this work was abandoned until May 22, when the work was resumed.

The work of constructing the Basin wall on the piles already driven was commenced on July 18, 1907.

The total value of the work done, as shown by the November, 1907, estimate, was \$197,445.69, the principal items of which were as follows:—

Earth excavation and refill,	. . .	165 lin. ft.
Earth filling,	. . . . .	376,145 cu. yds.
Piles in place,	. . . . .	154,834 lin. ft.
Drains,	. . . . .	1,657 lin. ft.
Concrete masonry,	. . . . .	3,249 cu. yds.
Ashlar masonry,	. . . . .	171.3 cu. yds.
Sheeting left in place,	. . . . .	218.5 M. ft. B. M.

Yellow pine lumber in place in sewer outlets, . . . . .	48 M. ft. B. M.
Wrought iron and steel in place in sewer outlets, . . . . .	15,803 pounds.
Iron and other metal work in place, . . . . .	41.8 tons.
Extra work, . . . . .	\$1,314.79

*Contract No. 48, The Lumsden & Van Stone Company. — Furnishing and erecting Steam, Water and Air Piping, Boston.*

On Oct. 20, 1906, a contract for this work was made with The Lumsden & Van Stone Company for \$2,098.

A large proportion of the material to be furnished under this contract had been delivered at the close of the year, but erection had not been commenced.

The amount of the November, 1907, estimate was \$629.40.

*Contract No. 50, Holbrook, Cabot & Rollins Corporation. — Sections 4 and 5 of the Boston Marginal Conduit and Sections 2 and 3 of the Boston Embankment, Boston.*

On Nov. 5, 1906, a contract was made with the Holbrook, Cabot & Rollins Corporation for this work.

On April 3, 1907, an agreement was made with the contractor to extend this contract 2,000 feet farther up the river, the prices to be the same as on the original contract.

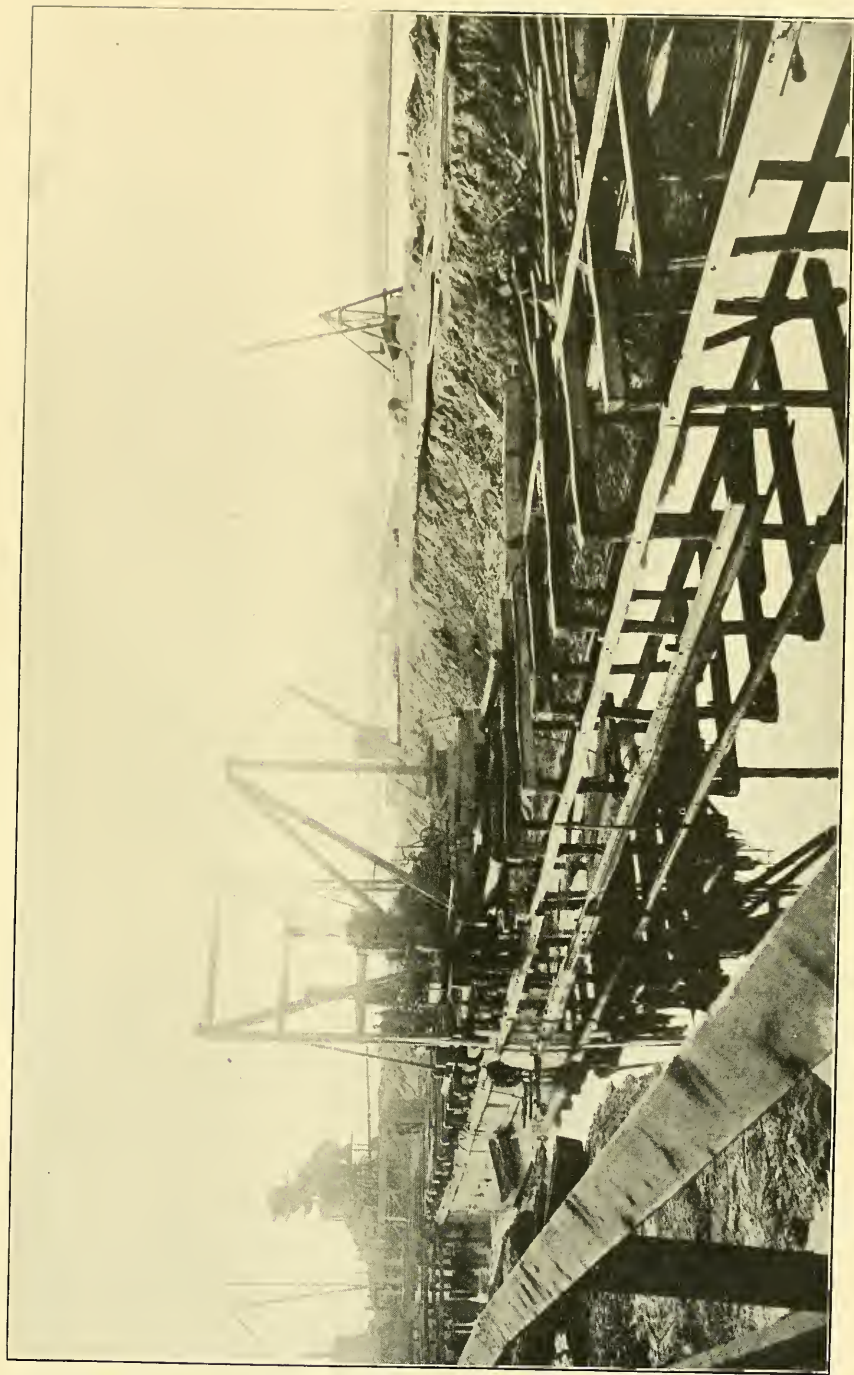
On April 4 the contractor was notified to suspend the work of driving piles in the Boston Marginal Conduit pending a decision of the Boston Transit Commission as to the location of the Riverbank subway. On April 10, this matter being settled, the work was resumed.

The total value of the work done, as shown by the November, 1907, estimate, was \$82,430.69, the principal items of which were as follows:—

Earth filling, . . . . .	116,670 cu. yds.
Piles in place, . . . . .	107,037 lin. ft.

*Contract No. 51, Lynch & Woodward. — Furnishing and erecting a Boiler Plant, Boston.*

On Nov. 12, 1906, bids were opened for erecting a boiler plant at the Lock, and on Dec. 4, 1906, a contract was made with Lynch & Woodward for \$2,164.



BOSTON MARGINAL CONDUIT — SHEETING FOR TRENCH.





The work to be done under this contract consisted in furnishing and erecting, sound and complete in all respects, a boiler plant comprising two boilers with settings, grates, fronts, feed and blow-off piping, gages, uptakes, dampers, flue, etc., all complete and erected ready to generate steam.

The boilers called for by this contract were delivered in the spring of 1907, but the erection was deferred until the autumn, on account of other work at the Lock.

Work on the foundations of the boilers was started on November 18. At the end of the year the boilers were in place and nearly ready for use, and a payment of \$541 had been made on the contract.

*Contract No. 57, William H. Wood & Company. — Furnishing Spruce Lumber for repairing Temporary Bridge.*

Bids were received for the estimated quantity of lumber required for repairing the temporary bridge to Jan. 1, 1908, and on Feb. 4, 1907, a contract was made with William H. Wood & Company, at a price of \$21 per M. ft. B. M. for both 2-inch and 3-inch plank. The estimated quantity to be required was 140 M. ft. B. M. of 2-inch and 10 M. ft. B. M. of 3-inch spruce plank.

This material was delivered throughout the year as needed for repairs on the bridge.

*Contract No. 58, Hiram W. Phillips. — Lowering the Commercial Avenue Sewer Siphon under Lechmere Canal, Cambridge.*

Bids were received for lowering the Commercial Avenue sewer siphon, and on Feb. 13, 1907, a contract was made with Hiram W. Phillips for this work for \$3,150, with the provision that if quicksand were encountered an additional cost, not to exceed \$600, would be allowed for driving sheeting.

On March 1 a pulsometer began the work of pumping out the shafts at each end of the siphon. On April 2 the box was raised and the necessary changes made, on April 18 the siphon was lowered into position, and on April 30 the connections at the ends of the siphon were made.

The work was completed and a final estimate made on May 10, 1907, the total amount paid being \$3,931.34.

*Contract No. 59, The Lockwood Manufacturing Company. — Furnishing and erecting a Timber Ice-run Sluice-gate, Boston.*

On May 27, 1907, bids were opened for the timber ice-run gate for the upper lock-gate, and on June 3 a contract was made for this work with The Lockwood Manufacturing Company for \$847.

The work to be done under this contract was completed in the shop and ready for installation during the year, and a payment amounting to \$431.97 was made.

*Contract No. 60, Link-Belt Company. — Furnishing Lock-gate Operating Machinery, Boston.*

On April 15, 1907, bids were opened for the operating machinery for the lock-gates at the Lock, and on April 23 a contract was made with the Link-Belt Company for \$10,000.

The work to be done under this contract was nearly completed in the shop, but no material was delivered during the year and no payment made.

*Contract No. 63, Baltimore Bridge Company. — Furnishing Lock-gate Operating Chain Supports, Boston.*

On April 22, 1907, bids were received, and on May 9, 1907, a contract was made with the Baltimore Bridge Company, of Baltimore, Md., for the lock-gate operating chain supports. The full amount of the contract, including some additional material, was \$5,143.

All the material to be furnished under this contract was delivered during the year, and \$4,371.55 was paid on the contract.

*Contract No. 64, Gibby Foundry Company. — Furnishing Castings, Boston.*

On March 19, 1907, bids were opened for castings, and on March 21, 1907, a contract was made with the Gibby Foundry Company for \$4,871.

The work consisted of making and delivering the cast-iron rail chairs for the lock-gate tracks.

This contract was completed and final payment made during the year.

*Contract No. 66, The Cutler-Hammer Manufacturing Company. — Furnishing Controlling Devices for Operating Motors of Main Lock-gates, Boston.*

On May 22, 1907, a contract was made with The Cutler-Hammer Manufacturing Company for furnishing the electrical control for operating the motors for the main lock-gates, the amount being \$2,958.

The work to be done consisted in furnishing, ready for erection, with all the necessary instruments, appliances, etc., one main switchboard panel; two 2 by 50 horse-power 500-volt, multiple contactor type, series parallel controllers, including resistances, master controllers and limit switches; two auxiliary spare controllers, manually operated for series control only, including drums and resistances, and two indicating lamp panels.

Part of the material to be furnished under this contract was delivered during the year, but no payment was made.

*Contract No. 68, George McQuesten Company. — Furnishing Yellow Pine Lumber for Stop-planks, Boston and Cambridge.*

Bids were received, and on May 31, 1907, the contract was placed with the George McQuesten Company for furnishing and delivering about 23,000 feet B. M. of Georgia or Florida long-leaf yellow pine of the quality known as "prime," inspection according to the interstate rules of 1905, approved Dec. 10, 1904. The price named in the contract was \$40 per M. ft. B. M.

This contract was completed during the year and final payment was made.

*Contract No. 69, Camden Iron Works. — Furnishing Cast-iron Pipes and Special Castings, Boston.*

On June 15, 1907, bids were received for cast-iron pipes and special castings, and on June 27 a contract was made with the Camden Iron Works.

The contract called for furnishing and delivering 30 lengths of 48-inch pipe and 4 48-inch  $\frac{1}{16}$  curves. The estimated amount of the contract was \$4,700.45.

Most of the material to be furnished under this contract was delivered during the year, and payments amounting to \$4,168.36 were made.

*Contract No. 70, Patrick McGovern. — Building the Main Portion of the Cambridge Marginal Conduit, Cambridge.*

Bids were received on Aug. 5, 1907, for building the main portion of the Cambridge Marginal Conduit, and on Aug. 13, 1907, a contract was made with Patrick McGovern.

On the basis of the preliminary estimate of quantities, the contract called for \$55,320.

The work to be done consists of the construction of a conduit about 1,800 feet in length, extending from the corner of Binney Street and Commercial Avenue to the sluices at the Cambridge end of the Charles River Dam, except for a gap of about 200 feet at Lechmere Canal; stop-plank chambers at both sides of Lechmere Canal and gate and stop-plank chambers near Binney Street; a flushing conduit about 50 feet long near Binney Street; two connections with the Binney Street sewer; and the relocation of a portion of the Commercial Avenue sewer and the making of connections with existing portions.

The principal items of the work are:—

Earth excavation and refill for conduit, . . .	1,900 lin. ft.
Other earthwork, . . . . .	360 cu. yds.
Piles in place, . . . . .	39,500 lin. ft.
Underdrains, . . . . .	1,800 lin. ft.
Concrete masonry, . . . . .	2,100 cu. yds.
Sheeting left in place, . . . . .	120 M. ft. B. M.
Placing iron and other metal work, . . . . .	40 tons.

On August 30 the work of erecting a building for storing cement was started, and the excavation for the trench was commenced on September 9. The first concrete was placed for the floor of the south stop-plank chamber on October 5, and the concrete for this chamber was practically completed on October 19. Work was started on the north stop-plank chamber

September 19 and was continued intermittently until October 31, when the excavation was finished and the foundation piles were driven ready for placing concrete, which was begun November 2 and practically completed November 15.

The value of the work done at the end of the year, as shown by the November, 1907, estimate, was \$2,677.54, the principal items being:—

Earth excavation for conduit, . . . . .	70 lin. ft.
Piles in place, . . . . .	1,926 lin. ft.
Concrete masonry, . . . . .	133 cu. yds.

*Contract No. 71, Dodd & McLaughlin. — Furnishing and erecting Tide-gates, Boston.*

On July 16, 1907, a contract was made with Dodd & McLaughlin for tide-gates for the Boston Marginal Conduit overflows, the amount of the contract being \$1,899.30.

The work to be done consists in furnishing four tide-gate frames, with gates and appurtenances, and in erecting the gates on the frames after the frames have been put in place in the masonry.

Part of the material to be furnished under this contract was delivered during the year and the remainder has been stored until required. No payment was made on the contract.

*Contract No. 72, American Luxfer Prism Company of Illinois. — Building Sidewalk Lights at the Sluices, Cambridge.*

On Aug. 26, 1907, bids were received for making and erecting sidewalk lights in the down-stream sidewalk over the sluices at the Dam, and on Sept. 12, 1907, a contract was made for this work with the American Luxfer Prism Company of Illinois. The amount of the contract was \$1,350.

The material called for under this contract was delivered during the week ending November 18, and a large part of the work of erection was completed during the year. The value of the work done, as shown by the estimate of November 29, was \$1,215.



*Contract No. 75, Westinghouse Traction Brake Company. —  
Furnishing Air Compressor Plant, Boston.*

On Aug. 30, 1907, a contract was made with the Westinghouse Traction Brake Company for constructing the air compressor plant needed for the Lock. The amount of the contract was \$1,393.20.

The work to be done consists in furnishing and delivering at the Lock the following equipment, complete and in good working order, with the necessary appurtenances:—

- 2 D-4-EG motor driven air compressors arranged for continuous operation, with water jackets on the air cylinders.
- 1 type "J" governor.
- 4 reservoirs, 24½ inches diameter, 72 inches long.
- 1 marbled slate switchboard.

No material had been delivered at the end of the year and no payment had been made.

*Contract No. 76, Hiram W. Phillips. — Building an Inverted Siphon for the Cambridge Marginal Conduit, at Lechmere Canal, Cambridge.*

On Sept. 9, 1907, bids were received for building an inverted siphon for the Cambridge Marginal Conduit, at Lechmere Canal, and on Sept. 12, 1907, a contract was made with Hiram W. Phillips for the construction of the siphon. The amount of the contract was \$14,500.

At the end of the year the dredging had been done and some of the piles for supporting the pipes had been driven. The value of the work done, as shown by the November, 1907, estimate, was \$870.

*Contract No. 78, The Lockwood Manufacturing Company. —  
Constructing and erecting a Sluice-gate in the Cambridge Marginal Conduit, Cambridge.*

On Sept. 16, 1907, bids were opened for constructing a sluice-gate for the Cambridge Marginal Conduit, and on Sept. 19, 1907, a contract was made with The Lockwood Manufacturing Company for the gate. The amount of the contract was \$1,673.

The work to be done consisted in constructing and erecting a 4' 3" by 6' sluice-gate, with operating stand and appurtenances.

This gate had not been delivered at the end of the year and no payment had been made.

Respectfully submitted,

HIRAM A. MILLER,  
*Chief Engineer.*

Boston, March 17, 1908.



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## APPENDICES.

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## APPENDIX A.

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### CHAPTER 465 OF THE ACTS OF THE YEAR 1903.

#### AN ACT TO AUTHORIZE THE CONSTRUCTION OF A DAM ACROSS THE CHARLES RIVER BETWEEN THE CITIES OF BOSTON AND CAMBRIDGE.

*Be it enacted, etc., as follows:*

SECTION 1. The governor of the Commonwealth, with the advice and consent of the council, shall appoint three commissioners, residents of the metropolitan parks district, who shall constitute the Charles river basin commission, hereinafter called the commission, and who shall be sworn before entering upon the duties of their office. One commissioner shall be designated by the governor as chairman, and two commissioners shall constitute a quorum. The term of office shall be three years, and all vacancies shall be filled by the governor, with the advice and consent of the council. Any commissioner may be removed by the governor, with the advice and consent of the council, for such cause as he shall deem sufficient and shall assign in the order of removal. Each commissioner shall receive an annual salary of such amount as the governor and council shall determine.

Charles river  
basin commis-  
sion, appoint-  
ment, term,  
etc.

Compensation.

SECTION 2. The commission may appoint a secretary, engineers and assistants, shall keep accurate accounts of its expenditures, and shall make an annual report of its doings, including an abstract of its accounts, to the governor and council. The commission whenever the Commonwealth has been authorized by the United States to build a dam and lock under the provisions of this act, shall proceed to do the work herein required of it, and shall in the meantime make examinations and plans therefor.

Powers and  
duties.

Dam to be  
constructed  
across Charles  
river, etc.

SECTION 3. The commission shall construct across Charles river between the cities of Boston and Cambridge, a dam, at least sufficiently high to hold back all tides and to maintain in the basin above the dam a substantially permanent water level not less than eight feet above Boston base. The dam shall occupy substantially the site of the present Craigie bridge, which shall be removed by the commission. The dam shall be not less than one hundred feet in width at said water level and a part thereof shall be a highway and the remainder shall be a highway, or a park or parkway, as the commission shall determine. The dam shall be furnished with a lock not less than three hundred and fifty feet in length between the gates, forty feet in width and thirteen feet in depth below Boston base, and shall be built with a suitable drawbridge or drawbridges, wasteways and other appliances. The part of the dam used as a highway shall be maintained and operated in the same manner as the Cambridge bridge, and under the laws now or hereafter in force relating to said bridge.

Navigable  
channels to be  
dredged.

SECTION 4. The commission shall dredge navigable channels in the basin from the lock to the wharves between the dam and Cambridge bridge, to Broad canal and to Lechmere canal, the channel to be not less than one hundred feet in width and eighteen feet in depth; shall dredge Broad canal to such depths as will afford to and at the wharves thereon not less than seventeen feet of water up to the Third Street draw, not less than thirteen feet of water from the Third Street draw to the Sixth Street draw, and not less than eleven feet of water from the Sixth Street draw to the railroad draw, and not less than nine feet of water for one hundred and twenty-five feet above the railroad draw; shall dredge Lechmere canal to such depths as will afford to and at the wharves thereon not less than seventeen feet of water up to and including Sawyer's lumber wharf, and not less than thirteen feet of water from said wharf up to the head of the canal at Bent street; all depths aforesaid to be measured from the water level to be maintained in the basin.

The commission shall do all such dredging and all strengthening of the walls of the canals and of the basin where dredging is done by the driving of prime oak piles two feet on centres along the front of said wharves or walls, and all removing and relocating of pipes and conduits made necessary by such dredging, so that vessels requiring a depth of water not exceeding the respective depths above prescribed can lie alongside of, and in contact with, the wharves; and this work shall be done in such manner as to cause the least possible inconvenience to abutters, and shall be finished on or before the completion of the dam; and after the walls or wharves have been so strengthened, all repairs on or rebuilding of the walls and wharves shall be done by the abutters.

Manner of  
dredging, etc.

The commission shall do such dredging in the basin outside of the channels aforesaid as may be necessary for the removal of sewage, sludge or any offensive deposit; shall do such other dredging as it shall deem proper, and shall take all proper measures for the destruction of malarial mosquitoes in the basin and its vicinity.

Certain other  
dredging to be  
done, etc.

SECTION 5. The commission, before the completion of the dam, shall construct marginal conduits on the north side of the basin from the outlet of the overflow channel in Binney street to a point below the dam, and on the south side of the basin from the present outlet of the Back Bay Fens to a point below the dam, and may construct an extension thereof toward, or to, St. Mary street, the conduits to be used to receive and conduct below the dam the overflow from sewers and the surface drainage and other refuse matter which would otherwise pass into the basin.

Marginal  
conduits to be  
constructed,  
etc.

SECTION 6. The commission, for the purpose of carrying out the provisions of the preceding sections, may from time to time take in fee or otherwise, by purchase or otherwise, for the Commonwealth, or the city of Boston or the city of Cambridge, as the commission shall determine, lands, flats and lands covered by tide-water on Charles river, by filing in the registry of deeds for the county and district in which the lands or flats are

Certain land  
etc., may be  
taken, etc.

situated a description thereof, sufficiently accurate for identification, signed by a majority of the commissioners; and any person whose property is so taken may have compensation therefor as determined by agreement with the commission, and if they cannot agree the compensation may be determined by a jury in the superior court for the county where the property is situated under the same provisions of law, so far as they are applicable, which apply in determining the value of lands taken for highways under chapter forty-eight of the Revised Laws, upon petition therefor by the commission, or by such person, filed in the clerk's office of said court against the Commonwealth or the city for which the lands or flats are taken within one year after the taking, and costs shall be taxed and execution issued as in civil cases.

The metropolitan park commission to have exclusive control of dam, etc.

SECTION 7. The metropolitan park commission, when the work provided for in the preceding sections is finished, shall, subject to the powers vested by law in the state board of health, have exclusive control of the dam and lock and of the basin and river between the dam and the city of Waltham, as a part of the metropolitan parks system, and of all poles, wires and other structures placed or to be placed on, across, over or in any part of said basin, dam or lock, and of the placing thereof, except the part of the dam used as a highway and the bridges and other structures erected by any city or town within its limits and upon its own lands; may make reasonable rules and regulations, not impairing freight traffic, for the care, maintenance, protection and policing of the basin; and throughout the year shall operate the lock without charge, maintain the lock, channels and canals aforesaid at the depths aforesaid, and clear of obstructions caused by natural shoaling or incident to the building of the dam, and maintain the water in the basin at such level and the lock, channels and canals sufficiently clear of obstructions by ice so that any vessel ready to pass through the lock, and requiring no more depth of water than aforesaid, can pass through to the wharves aforesaid. In the event of an emergency,

May make rules and regulations, etc.



requiring the temporary reduction of such level, notice thereof shall be given to the occupants of said wharves, and such reduction shall not be lower nor continue longer than the emergency requires. Said metropolitan park commission may order the removal of all direct sewage or factory waste as a common nuisance from the river and its tributaries below the city of Waltham; and no sewer, drain, overflow or other outlet for factory or house drainage shall hereafter be connected with the basin below said city without the approval of the metropolitan park commission.

Notice to be given in case of emergency requiring temporary reduction of level, etc.

Removal of direct sewage or factory waste may be ordered, etc.

SECTION 8. The Commonwealth shall in the first instance pay all expenses incurred in carrying out the provisions of the preceding sections, and the same shall, except as provided in the following section, constitute part of the cost of construction and maintenance of the metropolitan parks system; and in addition to the amounts heretofore authorized for such construction the treasurer and receiver-general shall, from time to time, as authorized by the governor and council, issue notes, bonds or scrip, in the name and behalf of the Commonwealth, entitled Charles River Basin Loan, to the amount which the commission may deem necessary for the expenses incurred under the first six sections of this act; and all acts and parts of acts relative to loans for such construction and providing for their payment shall, so far as they may be applicable and not inconsistent herewith, apply to such notes, bonds and scrip, and to their payment.

Payment of expenses.

Charles River Basin Loan.

SECTION 9. The commissioners next appointed under the provisions of chapter four hundred and nineteen of the acts of the year eighteen hundred and ninety-nine, and amendments thereof, in apportioning the expenses of maintaining the metropolitan parks system shall include as part thereof the expense of maintenance incurred under the preceding sections of this act; shall also determine, as they shall deem just and equitable, what portion of the total amount expended for construction under sections three, four, five and six of this act shall be apportioned to the cities of Boston and Cam-

Apportionment of expenses, etc.



bridge as the cost of the removal of Craigie bridge and the construction of a suitable bridge in place thereof, and the remainder shall be considered and treated as part of the cost of construction of the metropolitan park system. The treasurer and receiver-general shall determine the payments to be made each year by said cities, one-half by each, to meet the interest and sinking fund requirements for the amounts apportioned to them as the cost of such bridge, and the same shall be paid by each city into the treasury of the Commonwealth as part of its state tax.

City of Boston  
to do certain  
dredging,  
construct con-  
duits, sewer,  
etc.

SECTION 10. The city of Boston, by such officer or officers as the mayor may designate, shall forthwith after the passage of this act, do such dredging in the Back Bay Fens as the board of health of said city may require, shall construct a conduit between Huntington avenue and Charles river, to form an outlet into Charles river for the commissioners' channel of Stony brook, shall reconstruct the present connections between the river and the Fens so as to allow free access of water from the river into the streams and ponds in the Fens and thence into the river, and shall construct a sewer in the rear of the houses on the north side of Beacon street between Otter and Hereford streets. Such officer or officers may construct a conduit between Green street and Forest Hills and may construct or rebuild within five years one or more conduits for Stony brook between the westerly side of Elmwood street and the Fens: *provided, however*, that the expense of such conduits between Green street and Forest Hills and between Elmwood street and the Fens shall be paid for out of the annual appropriation for sewer construction under the provisions of chapter four hundred and twenty-six of the acts of the year eighteen hundred and ninety-seven and acts in amendment thereof or in addition thereto.

Proviso.

Wall or em-  
bankment may  
be built on  
Boston side of  
Charles river.

SECTION 11. The board of park commissioners of Boston may, with the approval of the mayor, build a wall or embankment on the Boston side of Charles river beginning at a point in the southwest corner of the stone wall of the Charlesbank, thence running

southerly by a straight or curved line to a point in Charles river not more than three hundred feet distant westerly from the harbor commissioners' line, measuring on a line perpendicular to the said commissioners' line at its intersection with the southerly line of Mount Vernon street, but in no place more than three hundred feet westerly from said commissioners' line; thence continuing southerly and westerly by a curved line to a point one hundred feet or less from the wall in the rear of Beacon street; thence by a line substantially parallel with said wall to the easterly line of the Back Bay Fens, extended to intersect said parallel line.

SECTION 12. The board of park commissioners of said city may take, in fee or otherwise, by purchase or otherwise, for said city, for the purpose of a public park such lands, flats and lands covered by tide-water between Charles, Brimmer and Back streets and the line of the wall or embankment aforesaid, as the mayor shall approve, by filing in the registry of deeds for the county of Suffolk a description thereof sufficiently accurate for identification, signed by a majority of the commissioners, and shall construct a public park on the lands so taken; and any person whose property is so taken may have compensation therefor as determined by agreement with the board, and if they cannot agree the amount thereof may be determined by a jury in the superior court for the county of Suffolk, under the same provisions of law, so far as they may be applicable, which apply in determining the value of lands taken for highways under chapter forty-eight of the Revised Laws, upon petition therefor by the board, or by such person, filed in the clerk's office of said court against said city within one year after the taking, and costs shall be taxed and execution issued as in civil cases.

Certain lands, flats, etc., may be taken for a public park.

SECTION 13. The city of Boston shall pay the expenses incurred under sections ten, eleven and twelve of this act, except as otherwise provided in section ten of this act; and to meet said expenses the city treasurer of the city shall, from time to time, on the request of the mayor, issue and sell bonds of the city to an amount

City of Boston to pay certain expenses, etc.

City treasurer to issue bonds, etc.

not exceeding eight hundred thousand dollars, and the bonds so issued shall not be reckoned in determining the legal limit of indebtedness of the city.

The Boston and Maine Railroad to remove certain structures, etc.

SECTION 14. The lock shall be built above the lower line of the dam, and the Boston and Maine Railroad shall, before the dam is completed, remove its bridge, piles and any other structures in Charles River which are southerly or westerly of a line defined in red on a plan filed in the office of the board of harbor and land commissioners marked "Plan showing line from above or southwest of which the Boston & Maine Railroad shall remove all of its structures in Charles River and between the harbor lines, May 25, 1903. Woodward Emery, Chairman of Harbor and Land Commissioners"; and may rebuild the same northerly and easterly of the line so defined. The draw in the new bridge shall not be easterly of nor more than fifty feet westerly from the location of the present draw, and shall be so located as to be directly opposite the lock. Within the limits herein prescribed the commission shall determine the position of the lock and draw.

Enforcement of provisions of act, etc.

SECTION 15. The supreme judicial court and the superior court shall, upon application of any party in interest, including any owner or occupant of property abutting on the basin or on Broad canal or Lechmere canal, have jurisdiction to enforce, or prevent violation of, any provision of this act and any order, rule or regulation made under authority thereof.

Repeal.

SECTION 16. Chapter three hundred and forty-four of the acts of the year eighteen hundred and ninety-one, as amended by section one of chapter four hundred and thirty-five of the acts of the year eighteen hundred and ninety-three, and chapter five hundred and thirty-one of the acts of the year eighteen hundred and ninety-eight are hereby repealed.

When to take effect.

SECTION 17. This act shall take effect on the first day of July in the year nineteen hundred and three. [Approved June 24, 1903.]

## CHAPTER 107 OF THE RESOLVES OF THE YEAR 1904.

RESOLVE TO PROVIDE FOR THE ACCEPTANCE BY THE COMMONWEALTH OF THE CONDITIONS AND LIMITATIONS SET FORTH IN A CERTIFICATE OF THE ACTING SECRETARY OF WAR OF THE UNITED STATES RELATING TO THE CONSTRUCTION AND MAINTENANCE OF THE CHARLES RIVER DAM.

*Resolved*, That the express conditions and limitations set forth in a certificate of Robert Shaw Oliver, acting secretary of war, under date of the eighteenth day of May, nineteen hundred and four, relating to the construction and maintenance of a dam across the Charles river, and to the maintenance of channels in connection therewith, be, and hereby are, accepted, and the obligations thereof assumed by the Commonwealth, as follows:—

Construction of Charles river dam, etc., acceptance of certain conditions, etc.

1. That detailed plans for the lock and dam, and of all channels to be dredged outside established harbor lines, shall be submitted to the secretary of war, and that the work be not begun until such plans have received his approval.

2. That the Charles River basin commission, or its successors, shall operate the lock, at their own expense, as a free navigable waterway of the United States, subject to such regulations as the secretary of war may promulgate.

3. That the emptying of the basin shall be subject to regulation by the secretary of war.

4. That the Charles River basin commission shall dredge and maintain in the basin, from the head of the lock to the channel in the river, a channel one hundred feet wide and eighteen feet deep at mean low water, in a location to be approved by the secretary of war.

5. That, whenever called upon to do so by the secretary of war, the Charles River basin commission shall deepen two and two tenths feet the channel eighty feet wide called for by the present approved project for the improvement of Charles river by the United States,



known as the project of June fourteen, eighteen hundred and eighty, the said deepening to extend as far as Brackett's wharf.

6. That the Commonwealth of Massachusetts shall maintain in the Charles river from the head of the thirty-five foot channel at Charles river bridge to the dam and lock, the necessary depth and width of channel for the commerce of the river, as fixed by the secretary of war.

7. That the alterations in the bridge of the Boston and Maine Railroad ordered by said act of the general court of Massachusetts shall be made, approval of the plans by the secretary of war being obtained, as required by law.

8. That the approval hereby granted shall not be construed as authorizing any invasion of property rights, or any act whereby a claim for damages against the United States might arise. [*Approved June 8, 1904.*]

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CHAPTER 65 OF THE ACTS OF THE YEAR 1905.

AN ACT TO AUTHORIZE THE CHARLES RIVER BASIN COMMISSION TO CONSTRUCT A TEMPORARY HIGHWAY BRIDGE OVER THE CHARLES RIVER.

*Be it enacted, etc., as follows:*

1903, 465, § 3,  
amended.

Dam to be constructed across  
Charles river,  
etc.

SECTION 1. Section three of chapter four hundred and sixty-five of the acts of the year nineteen hundred and three is hereby amended by inserting after the word "commission", in the eighth line, the words:—The commission may construct or otherwise provide a temporary highway bridge and approaches thereto for the use of vehicles and pedestrians during the construction of the dam,—so as to read as follows:—*Section 3.* The commission shall construct across Charles river between the cities of Boston and Cambridge, a dam, at least sufficiently high to hold back all tides and to maintain in the basin above the dam a substantially permanent water level not less than eight feet above Boston base. The dam shall occupy substantially the site of



the present Craigie bridge, which shall be removed by the commission. The commission may construct or otherwise provide a temporary highway bridge and approaches thereto for the use of vehicles and pedestrians during the construction of the dam. The dam shall be not less than one hundred feet in width at said water level and a part thereof shall be a highway and the remainder shall be a highway, or a park or parkway, as the commission shall determine. The dam shall be furnished with a lock not less than three hundred and fifty feet in length between the gates, forty feet in width and thirteen feet in depth below Boston base, and shall be built with a suitable drawbridge or drawbridges, wasteways and other appliances. The part of the dam used as a highway shall be maintained and operated in the same manner as the Cambridge bridge, and under the laws now or hereafter in force relating to said bridge.

SECTION 2. This act shall take effect upon its passage. [*Approved February 9, 1905.*]

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CHAPTER 158 OF THE ACTS OF THE YEAR 1906.

AN ACT TO PROHIBIT THE POLLUTION OF THE CHARLES RIVER WITHIN THE METROPOLITAN PARKS DISTRICT.

*Be it enacted, etc., as follows:*

SECTION 1. The state board of health is hereby authorized, upon the petition of the metropolitan park commission, or the mayor of any city or the selectmen of any town within the metropolitan parks district, and after notice to all parties interested and a hearing, to prohibit the entrance or discharge of sewage into that part of the Charles river within the present boundaries of said metropolitan parks district, and to prevent the entrance or discharge of every other substance, except surface or storm water, into said river within said parks district which may be injurious to public health, or may tend to create a public nuisance, or to obstruct the flow of water within said parks district, including all waste

The state board of health may prohibit the discharge of sewage into Charles river, etc.

or refuse from any factory or other establishment where persons are employed, unless the owner thereof shall use the best practicable and reasonably available means to render such waste or refuse harmless.

Jurisdiction.

SECTION 2. The supreme judicial court or any justice thereof and the superior court or any justice thereof shall have jurisdiction in equity to enforce the provisions of this act and any order made by the state board of health in conformity therewith. Proceedings to enforce any such order shall be instituted and prosecuted by the attorney-general upon the request of the state board of health.

SECTION 3. This act shall take effect upon its passage. [*Approved March 14, 1906.*]

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#### CHAPTER 368 OF THE ACTS OF THE YEAR 1906.

#### AN ACT RELATIVE TO THE TRANSFER OF THE CARE AND CONTROL OF THE CHARLES RIVER DAM AND BASIN TO THE METROPOLITAN PARK COMMISSION.

*Be it enacted, etc., as follows:*

1903, 465, § 3,  
amended.

Dam to be constructed across  
Charles river.

SECTION 1. Section three of chapter four hundred and sixty-five of the acts of the year nineteen hundred and three is hereby amended by striking out the last sentence thereof, so as to read as follows:— *Section 3.* The commission shall construct across Charles river between the cities of Boston and Cambridge, a dam, at least sufficiently high to hold back all tides and to maintain in the basin above the dam a substantially permanent water level not less than eight feet above Boston base. The dam shall occupy substantially the site of the present Craigie bridge, which shall be removed by the commission. The dam shall be not less than one hundred feet in width at said water level and a part thereof shall be a highway and the remainder shall be a highway, or a park or parkway, as the commission shall determine. The dam shall be furnished with a lock not less than three hundred and fifty feet in length between the gates, forty feet in width and thirteen feet

in depth below Boston base, and shall be built with a suitable drawbridge or drawbridges, wasteways and other appliances.

SECTION 2. Section seven of said chapter four hundred and sixty-five is hereby amended by inserting after the word "exclusive", in the fourth line, the words:—care and,— by inserting after the word "lock", in the fifth line, the words:—and of any highway, park or parkway, drawbridge or drawbridges, constructed in connection therewith,— by inserting after the word "lock", in the ninth line, the words:—highway, park or parkway, drawbridge or drawbridges,— by striking out the words "the part of the dam used as a highway and", in the tenth line, by striking out the word "the", before the word "basin", in the fourteenth line, and inserting in place thereof the word:—said,— by inserting after the word "basin", in the fourteenth line, the words:—dam, lock, highway, park, parkway, drawbridge or drawbridges, breaches of which rules shall be breaches of the peace, punishable as such,— by inserting after the word "lock", in the fifteenth line, the words:—and drawbridge or drawbridges,— and by adding at the end thereof the words:—Said metropolitan park commission shall also have and exercise over said basin, dam, lock, highway, park, parkway, drawbridge or drawbridges, all other power, duties and liabilities now imposed upon said commission by chapter four hundred and seven of the acts of the year eighteen hundred and ninety-three and acts in addition thereto and in amendment thereof relative to the care, maintenance and control by said commission of open spaces for exercise and recreation so far as the provisions of said acts are consistent with the provisions of this act,— so as to read as follows:—*Section 7.* The metropolitan park commission, when the work provided for in the preceding sections is finished, shall, subject to the powers vested by law in the state board of health, have exclusive care and control of the dam and lock and of any highway, park or parkway, drawbridge or drawbridges, con-

1903, 465, § 7,  
amended.

The metro-  
politan park  
commission to  
have care of  
dam, etc.

structed in connection therewith and of the basin and river between the dam and the city of Waltham, as a part of the metropolitan parks system, and of all poles, wires and other structures placed or to be placed on, across, over or in any part of said basin, dam or lock, highway, park or parkway, drawbridge or drawbridges, and of the placing thereof, except the bridges and other structures erected by any city or town within its limits and upon its own lands; may make reasonable rules and regulations, not impairing freight traffic, for the care, maintenance, protection and policing of said basin, dam, lock, highway, park, parkway, drawbridge or drawbridges, breaches of which rules shall be breaches of the peace, punishable as such; and throughout the year shall operate the lock and drawbridge or drawbridges without charge, maintain the lock, channels and canals aforesaid at the depths aforesaid, and clear of obstructions caused by natural shoaling or incident to the building of the dam, and maintain the water in the basin at such level and the lock, channels and canals sufficiently clear of obstructions by ice so that any vessel ready to pass through the lock, and requiring no more depth of water than aforesaid, can pass through to the wharves aforesaid. In the event of an emergency, requiring the temporary reduction of such level, notice thereof shall be given to the occupants of said wharves, and such reduction shall not be lower nor continue longer than the emergency requires. Said metropolitan park commission may order the removal of all direct sewage or factory waste as a common nuisance from the river and its tributaries below the city of Waltham; and no sewer, drain, overflow or other outlet for factory or house drainage shall hereafter be connected with the basin below said city without the approval of the metropolitan park commission. Said metropolitan park commission shall also have and exercise over said basin, dam, lock, highway, park, parkway, drawbridge or drawbridges, all other power, duties and liabilities now imposed upon said commission by chapter four hundred and seven of



the acts of the year eighteen hundred and ninety-three and acts in addition thereto and in amendment thereof relative to the care, maintenance and control by said commission of open spaces for exercise and recreation so far as the provisions of said acts are consistent with the provisions of this act.

SECTION 3. When the work of the Charles river basin commission as provided for in said chapter four hundred and sixty-five is finished, said commission shall certify the fact in writing to the metropolitan park commission, and such certificate or a copy of the same, attested by any member of the metropolitan park commission or by its secretary, shall be prima facie evidence that the exclusive care and control of said dam, lock, highway, park or parkway, drawbridge or drawbridges, are vested in the metropolitan park commission.

When dam is completed the Charles river basin commission to certify the same, etc.

SECTION 4. So much of chapter four hundred and sixty-seven of the acts of the year eighteen hundred and ninety-eight as is inconsistent herewith is hereby repealed.

Repeal.

SECTION 5. This act shall take effect upon its passage. [*Approved May 8, 1906.*]

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#### CHAPTER 402 OF THE ACTS OF THE YEAR 1906.

#### AN ACT RELATIVE TO THE CHARLES RIVER BASIN.

*Be it enacted, etc., as follows:*

SECTION 1. Section eight of chapter four hundred and sixty-five of the acts of the year nineteen hundred and three is hereby amended by striking out the words "the preceding", in the third line, by inserting after the word "sections", in the same line, the words:— one, two, three, four, five, six, seven, eleven and twelve, as amended, — and by striking out the words "the first six sections", in the thirteenth line, and inserting in place thereof the words:— sections one, two, three, four, five, six, eleven and twelve, — so as to read as follows:— *Section 8.* The Commonwealth shall in the first instance pay all expenses incurred in carrying out the

1903, 465, § 8, amended.

Payment of expenses.



provisions of sections one, two, three, four, five, six, seven, eleven and twelve, as amended, and the same shall, except as provided in the following section, constitute part of the cost of construction and maintenance of the metropolitan parks system; and in addition to the amounts heretofore authorized for such construction the treasurer and receiver general shall, from time to time, as authorized by the governor and council, issue notes, bonds or scrip, in the name and behalf of the Commonwealth, entitled Charles River Basin Loan, to the amount which the commission may deem necessary for the expenses incurred under sections one, two, three, four, five, six, eleven and twelve of this act; and all acts and parts of acts relative to loans for such construction and providing for their payment shall, so far as they may be applicable and not inconsistent herewith, apply to such notes, bonds and scrip, and to their payment.

1903, 465, § 9,  
amended.

Apportion-  
ment of ex-  
penses.

SECTION 2. Said chapter four hundred and sixty-five is hereby further amended by striking out section nine and inserting in place thereof the following:—*Section 9.* The commissioners appointed under the provisions of chapter four hundred and nineteen of the acts of the year eighteen hundred and ninety-nine, and amendments thereof, in apportioning the expenses of maintaining the metropolitan parks system shall include as part thereof the expense of maintenance incurred under sections one, two, three, four, five, six, seven, eight, eleven and twelve of this act; shall also determine as they shall deem just and equitable what portion of the total amount expended for construction under sections three, four, five and six of this act shall be apportioned to the cities of Boston and Cambridge as the cost of the removal of Craigie bridge and the construction of a suitable bridge in place thereof, and the remainder shall be considered and treated as part of the cost of construction of the metropolitan park system; and shall also determine as they shall deem just and equitable, what portion of the total amount expended for the cost of construction of the marginal

conduit on the south side of the basin and of the embankment and park, provided for by this act, shall be apportioned to the city of Boston as the cost of the construction of said embankment and park, and what portion shall be fixed as the cost of said marginal conduit. The cost of the construction of said embankment and park, as so apportioned shall be repaid to the Commonwealth by the city of Boston with four per cent interest from the date of said apportionment, and bills for the betterments assessed by the Charles River Basin commission under the provisions of this act shall be listed and committed to the collector of taxes of the city of Boston, and shall be collected under the same provisions of law as betterments levied for the construction of highways in the city of Boston. All amounts so received by the city of Boston from said betterments shall be applied first toward paying to the Commonwealth said apportionment for the cost of construction of said embankment and park as above provided; and second to the interest and sinking fund requirements of the loan of the city of Boston authorized by this act. The treasurer and receiver general shall determine the payments to be made each year by the cities of Boston and Cambridge, one half by each, to meet the interest and sinking fund requirements for the amounts apportioned to them as the cost of such bridge, and the same shall be paid by each city into the treasury of the Commonwealth as a part of its state taxes. The city treasurer of Boston shall from time to time on the request of the mayor issue and sell bonds of the city to meet the payments to the Commonwealth required by this section, and the bonds so issued shall not be reckoned in determining the statutory limit of indebtedness of the city.

SECTION 3. Said chapter four hundred and sixty-five is hereby further amended by striking out section eleven and inserting in place thereof the following:—

*Section 11.* The Charles River Basin commission shall build a wall and embankment on the Boston side of Charles river, beginning at a point in the southwest

1903, 465, § 11,  
amended.

Wall and embankment may be built on Boston side of Charles river.

corner of the stone wall of the Charlesbank, thence running southerly by a straight or curved line to a point in Charles river not more than three hundred feet westerly from the harbor commissioners' line, measuring on a line perpendicular to the said commissioners' line at its intersection with the southerly line of Mount Vernon street, but in no place more than three hundred feet westerly from the said commissioners' line; thence continuing southerly and westerly by a curved line to a point one hundred feet or less from the wall in the rear of Beacon street; thence by a line substantially parallel with said wall, but at no point more than one hundred feet distant therefrom, to the westerly line of the Back Bay Fens extended to intersect said parallel line.

1903, 465, § 12,  
amended.

Certain lands,  
etc., may be  
taken for a  
public park.

Proviso.

SECTION 4. Said chapter four hundred and sixty-five is hereby further amended by striking out section twelve and inserting in place thereof the following:—  
*Section 12.* The Charles River Basin commission shall acquire in fee, or otherwise, by purchase or otherwise, for the city of Boston, for the purpose of a public park, parkway or street, flats and lands covered by tide water and lying easterly of Charlesgate West by filing in the registry of deeds for the county of Suffolk a description thereof sufficiently accurate for identification, signed by a majority of said commission, and shall construct a public park or lay out a parkway or street, on the lands so taken: *provided, however,* that nothing herein contained shall authorize the taking for any purpose of Back street, or of any lot or part of any lot on the north side of Beacon street or of any flats or lands covered by tide water south of West Boston bridge and lying between the line of the wall the construction whereof is provided for in section eleven of this act and the Cambridge shore, nor the taking for any purpose but that of a public park of any flats or land covered by tide water between said wall and the sea wall as at present existing; and any person whose property is so taken may have compensation therefor as determined

by agreement with the commission, or, in the absence of such agreement, the amount thereof may be determined by a jury in the superior court for the county of Suffolk upon petition therefor by the commissioners or by such person, filed in the clerk's office of said court, against the Commonwealth, and within one year after the taking, and under the same proceedings and provisions of law, so far as they may be applicable, which apply in determining the value of lands taken for highways under chapter forty-eight of the Revised Laws. And because of the construction and maintenance of the embankment and park as herein provided and the establishment of the northerly line thereof as herein finally fixed and defined as the limit of any embankment or construction northerly from Beacon street between the Charlesbank and the Back Bay Fens, said commission shall within two years after the completion of the park as herein provided and defined determine the value of the benefit or advantage, from the establishment of said embankment and park, beyond that resulting to all real estate in the city of Boston, to each parcel of real estate east of the Back Bay Fens bordering upon or near said embankment and park as so completed, and shall assess such betterment upon the said estates so benefited; but such assessments shall in no event exceed in the aggregate one half of the actual cost of construction of said embankment and park, exclusive of the cost of the marginal conduit, nor the sum of thirty dollars for each lineal front foot of private ownership. Any person aggrieved by such assessment of betterments may within one year thereafter file a petition in the superior court for the county of Suffolk, and after notice to the city of Boston shall have a trial by jury therein, and costs shall be awarded as provided in section seven of chapter fifty of the Revised Laws.

SECTION 5. Section thirteen of said chapter four hundred and sixty-five is hereby amended by striking out the words "sections ten, eleven and twelve", in the second line, and inserting in place thereof the words: —

1903, 465, § 13,  
amended.



City of Boston  
to pay certain  
expenses.

section ten, — and by striking out the words “section ten of this act”, in the third and fourth lines, and inserting in place thereof the words: — said section ten, — so as to read as follows: — *Section 13.* The city of Boston shall pay the expenses incurred under section ten of this act, except as otherwise provided in said section ten; and to meet said expenses the city treasurer of the city shall, from time to time, on the request of the mayor, issue and sell bonds of the city to an amount not exceeding eight hundred thousand dollars, and the bonds so issued shall not be reckoned in determining the legal limit of indebtedness of the city.

Repeal.

SECTION 6. Chapter three hundred and forty-four of the acts of the year eighteen hundred and ninety-one and chapter four hundred and thirty-five of the acts of the year eighteen hundred and ninety-three are hereby repealed.

SECTION 7. This act shall take effect upon its passage. [*Approved May 21, 1906.*]

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#### CHAPTER 404 OF THE ACTS OF THE YEAR 1907.

### AN ACT TO AUTHORIZE THE METROPOLITAN PARK COMMISSION JOINTLY WITH THE CHARLES RIVER BASIN COMMISSION TO GRANT LOCATIONS FOR BOAT HOUSES.

*Be it enacted, etc., as follows:*

Locations of  
boat houses on  
Charles river.

SECTION 1. The Charles river basin commission shall make provision in the construction and laying out of the park or parkway provided for by chapter four hundred and two of the acts of the year nineteen hundred and six, for the location of boat houses, landings thereon and floats in connection therewith. At any time after the passage of this act, upon the petition of any duly organized boat club for a location for a boat house, landing or floats in connection therewith, said commission and the metropolitan park commission by a majority of the members of both commissions acting jointly as one board for the purpose, and, after the



completion by said Charles river basin commission of the work imposed upon it by law, the metropolitan park commission alone, may grant to such boat club a suitable location, by lease or otherwise, with the right to erect a boat house thereon and to project landings and floats on the waters of the Charles river contiguous thereto, upon such terms, conditions, restrictions and agreements and for such period of years, not exceeding twenty-five, as said commissions acting jointly, or, after the completion of said work, as the metropolitan park commission may deem expedient. In passing upon such petition consideration shall be given to the fact that at the time of the passage of this act such boat club owned or occupied a boat house on the southerly or easterly side of the Charles river between Charlesgate west and the new dam, the point on the river bank at which such boat house was situated and the length of time during which it had been owned or maintained there.

SECTION 2. This act shall take effect upon its passage. [*Approved May 13, 1907.*]

## APPENDIX B.

## CONTRACTS MADE AND PENDING

1.	No. of Contract.	2.  WORK.	3.  No. of Bids.	AMOUNT OF BID.		6.  Contractor.
				4. Next to Lowest.	5. Lowest.	
1	1	Dam and Lock in the Charles River.	11	\$801,607 50 <sup>1</sup>	\$761,900 00	Holbrook, Cabot & Rollins Corporation.
2	2 <sup>2</sup>	Wooden block paving for temporary bridge.	- <sup>3</sup>	- <sup>3</sup>	11,700 00 <sup>1</sup>	United States Wood Preserving Company.
3	5	Pumps, . . . .	2	9,533 00 <sup>1</sup>	7,423 00	Henry R. Worthington.
4	19	Plans, specifications, engineering and patent rights for superstructure, operating machinery, etc., for drawbridge over Lock.	- <sup>3</sup>	- <sup>3</sup>	4,500 00 <sup>1</sup>	The Scherzer Rolling Lift Bridge Company.
5	23	Piles along walls of canals and Basin.	- <sup>3</sup>	- <sup>3</sup>	55,117 26 <sup>1</sup>	Holbrook, Cabot & Rollins Corporation.
6	24	Scherzer rolling lift bridge.	7	41,562 00	40,800 00 <sup>1</sup>	American Bridge Company of New York.
7	25	Sluice-gates at the sluices in the Dam.	2 <sup>4</sup>	27,993 00	24,800 00 <sup>1</sup>	Coffin Valve Company.
8	27	Sluice-gates on the lock-gates in the Lock.	- <sup>3</sup>	- <sup>3</sup>	17,093 00 <sup>1</sup>	Coffin Valve Company.
9	28	Tide-gates at the Dam and Lock.	2	4,907 00	4,438 00 <sup>1</sup>	Coffin Valve Company.
10	30	Lock-gates, . . . .	4	30,975 00	26,784 00 <sup>1</sup>	New Jersey-West Virginia Bridge Company.
11	32 <sup>2</sup>	Spruce lumber for repairing temporary bridge.	4	2,600 00	2,440 00 <sup>1</sup>	George W. Gale Lumber Company.
12	33 <sup>2</sup>	Castings and other metal.	2	3,285 63	2,025 10 <sup>1</sup>	Chelmsford Foundry Company.
13	34	White oak lumber for Lock.	1	-	646 43 <sup>1</sup>	George McQuesten Company.
14	35 <sup>2</sup>	Castings and other metal.	1	-	3,322 00 <sup>1</sup>	Gibby Foundry Company.
15	37	Electric dock capstans at Lock.	2 <sup>5</sup>	2,100 00 <sup>1</sup>	1,676 00	American Ship Windlass Company.
16	38 <sup>2</sup>	Motors for operating lock-gates.	2	2,700 00	2,635 40 <sup>1</sup>	Westinghouse Electric and Manufacturing Company.

<sup>1</sup> Contract based upon this bid.<sup>2</sup> Contract completed.<sup>3</sup> Competitive bids were not received on this contract.

## APPENDIX B.

DURING THE YEAR ENDING NOV. 30, 1907.

7. Date of Contract.	8. Date for Completion of Contract.	9. Date of Final Estimate.	10. Prices of Principal Items of Contract.	11. Amount of Contract.	12. Payments made to Nov. 30, 1907.	
Jan. 14, '05,	July 15, '08,	-	- -	\$860,000 00	\$541,978 53	1
Mar. 23, '05,	May 12, '05,	Apr. 26, '07,	- -	5,532 52	5,532 52	2
Sept. 30, '05,	-	-	- -	9,533 00	7,626 40	3
Aug. 25, '05,	-	-	- -	4,500 00	3,500 00	4
Dec. 4, '05,	-	-	- -	72,360 00	68,552 93	5
Mar. 16, '06,	-	-	- -	40,800 00	29,750 00	6
Mar. 16, '06,	-	-	- -	24,800 00	15,900 00	7
Mar. 6, '06,	-	-	- -	17,093 00	4,357 50	8
Mar. 16, '06,	-	-	- -	4,438 00	3,772 30	9
June 13, '06,	-	-	- -	26,784 00	15,300 00	10
Apr. 4, '06,	Jan. 1, '07,	Jan. 17, '07,	- -	3,699 14	3,699 14	11
May 23, '06,	July 22, '06,	July 30, '07,	- -	1,928 71	1,928 71	12
Apr. 11, '06,	-	-	- -	646 43	54 15	13
May 29, '06,	July 28, '06,	Dec. 26, '06,	- -	3,295 65	3,295 65	14
May 24, '06,	-	-	- -	2,100 00	1,575 00	15
May. 25, '06,	-	Feb. 5, '07,	- -	2,635 40	2,635 40	16

<sup>4</sup> Bids were based on different plans and specifications.<sup>5</sup> Bids were upon different types of capstans.

## CONTRACTS MADE AND PENDING DURING

1. No. of Con- tract.	2.  WORK.	3.  No. of Bids.	AMOUNT OF BID.		6.  Contractor.	
			4. Next to Lowest.	5. Lowest.		
1	40 <sup>1</sup>	Plug drain valves, .	2	\$1,096 00	\$867 71 <sup>2</sup>	Chapman Valve Manu- facturing Company.
2	41	Sluice-gates at the sluices and Boston Marginal Conduit.	- 3	- 3	11,862 00 <sup>2</sup>	Coffin Valve Company
3	43 <sup>1</sup>	Manganese bronze studs and bolts.	- 3	- 3	770 09 <sup>2</sup>	The William Cramp & Sons Ship & Engine Building Company.
4	44	Section 3 of the Boston Marginal Conduit and Section 1 of the Bos- ton Embankment.	7	241,845 00	232,700 00 <sup>2</sup>	Coleman Brothers.
5	45 <sup>1</sup>	Small boat lock-gates, .	4	1,337 50	850 00 <sup>2</sup>	Richard F. Keough.
6	46 <sup>1</sup>	Structural steel, . .	3	7,380 00 <sup>2</sup>	7,200 00 <sup>4</sup>	New England Structur- al Company.
7	47 <sup>1</sup>	Yellow pine timber for Lock stop-planks.	2	763 20	742 00 <sup>2</sup>	George McQuesten Company.
8	48	Steam, water and air piping.	9	2,158 00	2,098 00 <sup>2</sup>	The Lumsden & Van Stone Company.
9	49 <sup>1</sup>	Small boat lock-gate hinges.	- 3	- 3	1,260 00 <sup>2</sup>	The William Cramp & Sons Ship & Engine Building Company.
10	50	Sections 4 and 5 of the Boston Marginal Con- duit and Sections 2 and 3 of the Boston Embankment.	5	200,860 00 <sup>5</sup>	198,890 00 <sup>2, 6</sup>	Holbrook, Cabot & Rol- lins Corporation.
11	51	Boiler plant, . . .	6	2,068 00	2,030 00	Lynch & Woodward, Boston, Mass.
12	52 <sup>1</sup>	Twisted steel rods for reinforcing concrete.	4	1,726 07	1,706 23 <sup>2</sup>	Aberthaw Constructiou Company.
13	53 <sup>1</sup>	Gratings and ladders, .	3	1,525 00	1,223 00 <sup>2</sup>	L. M. Ham & Company, Boston, Mass.
14	54 <sup>1</sup>	Plug drain valves, .	2	923 40	419 00 <sup>2</sup>	Coldwell-Wilcox Com- pany, Newburgh, N. Y.
15	55 <sup>1</sup>	Castings, . . .	2	726 25	515 00 <sup>2</sup>	Gibby Foundry Com- pany.
16	56 <sup>1</sup>	Cast-iron troughs, .	1	-	6,060 00 <sup>2</sup>	Camden Iron Works, Philadelphia, Pa.
17	57	Spruce lumber for re- pairing temporary bridge.	4	3,320 00	3,150 00 <sup>2</sup>	William H. Wood & Company, Cam- bridge, Mass.
18	58 <sup>1</sup>	Lowering the Commer- cial Avenue sewer siphon, under Lech- mere Canal.	3	4,500 00	3,150 00 <sup>2, 6</sup>	Hiram W. Phillips, Quincy, Mass.

<sup>1</sup> Contract completed.<sup>2</sup> Contract based upon this bid.<sup>3</sup> Competitive bids were not received on this contract.

THE YEAR ENDING NOV. 30, 1907 — *Continued.*

7. Date of Contract.	8. Date for Completion of Contract.	9. Date of Final Estimate.	10. Prices of Principal Items of Contract.	11. Amount of Contract.	12. Payments made to Nov. 30, 1907.	
June 7, '06,	Aug. 6, '06,	Oct. 31, '06,	- -	\$850 54	\$850 54	1
June 14, '06,	-	-	- -	11,862 00	6,755 25	2
June 15, '06,	July 15, '06,	Nov. 21, '06,	- -	770 09	770 09	3
Sept. 24, '06,	Jan. 1, '08,	-	- -	310,000 00	167,828 84	4
Sept. 17, '06,	-	Jan. 18, '07,	- -	850 00	850 00	5
Sept. 19, '06,	Dec. 18, '06,	Mar. 16, '07,	- -	7,380 00	7,380 00	6
Sept. 13, '06,	Nov. 12, '06,	Jan. 31, '07,	- -	790 72	790 72	7
Oct. 20, '06,	-	-	- -	2,098 00	629 40	8
Sept. 24, '06,	Nov. 1, '06,	Nov. 19, '06,	- -	1,260 00	1,260 00	9
Nov. 5, '06,	Jan. 1, '08,	-	- -	430,000 00	70,066 09	10
Dec. 4, '06,	-	-	For the whole work, \$2,164.	2,164 00	541 00	11
Oct. 17, '06,	Feb. 1, '07,	Jan. 10, '07,	- -	1,767 79	1,767 79	12
Dec. 24, '06,	Feb. 7, '07,	Mar. 16, '07,	For the whole work, \$1,223.	1,223 00	1,223 00	13
Dec. 13, '06,	Mar. 13, '07,	Mar. 16, '07,	For the whole work, \$419.	419 00	419 00	14
Jan. 15, '07,	Apr. 15, '07,	July 22, '07.	For iron castings, \$0.045 and \$0.035 per lb.	571 01	571 01	15
Jan. 8, '07,	Apr. 23, '07,	June 15, '07,	For the whole work, \$6,060.	6,060 00	6,060 00	16
Feb. 4, '07,	Jan. 1, '08,	-	For 2-inch and 3-inch spruce plank, \$21 per M. ft. B. M.	3,150 00	2,762 70	17
Feb. 13, '07,	Apr. 1, '07,	May 10, '07,	For the whole work, \$3,150 plus the ad- ditional cost (not to exceed \$600) in- curred by encoun- tering quicksand.	3,931 34	3,931 34	18

<sup>4</sup> Bid did not comply with requirements of specifications.<sup>5</sup> This bid was on Section 4 of the Boston Marginal Conduit and Section 2 of the Boston Embankment.<sup>6</sup> Plus the additional cost (not to exceed \$600) incurred by encountering quicksand.



## CONTRACTS MADE AND PENDING DURING

1.	No. of Con- tract.	2.  WORK.	3.  No. of Bids.	AMOUNT OF BID.		6.  Contractor.
				4. Next to Lowest.	5. Lowest.	
1	59	Timber ice-run sluice-gate.	1	-	\$847 00 <sup>1</sup>	The Lockwood Manufacturing Company, East Boston, Mass.
2	60	Lock-gate operating machinery.	4	\$10,000 00 <sup>1</sup>	9,408 00 <sup>2</sup>	Link-Belt Company Chicago, Ill.
3	61 <sup>3</sup>	Gratings, ladders and covers.	3	1,385 00	1,306 00 <sup>1</sup>	Fred A. Houdlette & Son, Boston, Mass.
4	62 <sup>3</sup>	Twisted steel rods for reinforcing concrete.	2	2,373 75 <sup>1</sup>	1,997 18 <sup>2</sup>	Aberthaw Construction Company.
5	63	Lock-gate operating chain supports.	1	-	4,543 00 <sup>1</sup>	Baltimore Bridge Company, Baltimore, Md.
6	64 <sup>3</sup>	Castings, . . .	2	5,450 00	4,871 00 <sup>1</sup>	Gibby Foundry Company.
7	65 <sup>3</sup>	Cast-iron trough, . .	-4	- <sup>4</sup>	675 00 <sup>1</sup>	R. D. Wood & Company, Philadelphia, Pa.
8	66	Controlling devices for operating motors of main lock-gates.	-4	- <sup>4</sup>	2,958 00 <sup>1</sup>	The Cutler-Hammer Manufacturing Company, Milwaukee, Wis.
9	67 <sup>3</sup>	Twisted steel rods for reinforcing concrete.	5	2,051 54	1,922 43 <sup>1</sup>	H. P. Converse & Company, Boston, Mass.
10	68 <sup>3</sup>	Yellow pine lumber for stop-plates.	3	951 83	928 61 <sup>1</sup>	George McQuesten Company.
11	69	Cast-iron pipes and special castings.	3	5,076 90	4,700 45 <sup>1</sup>	Camden Iron Works.
12	70	Main portion of the Cambridge Marginal Conduit.	5	59,835 00	55,320 00 <sup>1</sup>	Patrick McGovern, Boston, Mass.
13	71	Tide-gates for Boston Marginal Conduit.	-4	- <sup>4</sup>	1,899 30 <sup>1</sup>	Dodd & McLaughlin, Boston, Mass.

<sup>1</sup> Contract based upon this bid.<sup>2</sup> Bid did not comply with requirements of specifications.

THE YEAR ENDING NOV. 30, 1907 — *Continued.*

7. Date of Contract.	8. Date for Completion of Contract.	9. Date of Final Estimate.	10. Prices of Principal Items of Contract.	11. Amount of Contract.	12. Payments made to Nov. 30, 1907.	
June 3, '07,	Feb. 24, '08,	-	For the whole work, \$847.	\$847 00	\$431 97	1
Apr. 23, '07,	Aug. 1, '07,	-	For the whole work, \$10,000.	10,000 00	-	2
June 28, '07,	Aug. 12, '07,	Sept. 16, '07,	For the whole work, \$1,306.	1,306 00	1,306 00	3
May 23, '07,	July 1, '07,	June 29, '07,	For square twisted steel rods, \$2.44 and \$2.64 per hundred lbs.	2,375 17	2,375 17	4
May 9, '07,	July 9, '07,	-	For the whole work, \$4,543.	5,143 00	4,371 55	5
Mar. 21, '07,	Apr. 21, '07,	May 2, '07,	For the whole work, \$4,871.	4,871 00	4,871 00	6
Apr. 11, '07,	Apr. 23, '07,	May 24, '07,	For the whole work, \$675.	675 00	675 00	7
May 22, '07,	Oct. 15, '07,	-	For the whole work, \$2,958.	2,958 00	-	8
May 31, '07,	Sept. 1, '07,	July 30, '07,	For square twisted steel rods, \$1.9375 and \$2.1125 per hundred lbs.	2,155 56	2,155 56	9
May 31, '07,	July 30, '07,	Sept. 18, '07,	For yellow pine lumber, \$40 per M. ft. B. M.	982 40	982 40	10
June 27, '07,	Aug. 27, '07,	-	For 48-inch cast-iron pipe, \$29.35 per ton of 2,000 lbs.; 48-inch $\frac{1}{16}$ curves, \$80 per ton of 2,000 lbs.	4,700 45	4,168 36	11
Aug. 13, '07,	May 1, '08,	-	For earth excavation and refill, \$11 per lin. ft. of trench; piles, \$0.20 per lin. ft.; underdrains, \$0.65 per lin. ft.; concrete masonry, \$9 and \$4.50 per cu. yd.; sheeting, \$35 per M. ft. B. M.; placing iron and other metal work, \$20 per ton of 2,000 lbs.; spruce lumber, \$40 per M. ft. B. M.	55,320 00	2,275 91	12
July 16, '07,	-	-	For the whole work, \$1,899.30.	1,899 30	-	13

<sup>3</sup> Contract completed.<sup>4</sup> Competitive bids were not received on this contract.

## CONTRACTS MADE AND PENDING DURING

1. No. of Contract.	2.  WORK.	3. No. of Bids.	AMOUNT OF BID.		6.  Contractor.
			4. Next to Lowest.	5. Lowest.	
1 72	Sidewalk lights at the sluices.	1	-	\$1,350 00 <sup>1</sup>	American Luxfer Prism Company of Illinois, Chicago, Ill.
2 73 <sup>2</sup>	Twisted steel rods for reinforcing concrete.	5	\$1,055 92	1,016 37 <sup>1</sup>	H. P. Converse & Company.
3 74	2-inch pump at Lock, .	2 <sup>3</sup>	600 00	495 00 <sup>1</sup>	The Lawrence Machine Company, Lawrence, Mass.
4 75	Air compressor plant, .	4 <sup>4</sup>	1,393 20 <sup>1</sup>	1,025 00	Westinghouse Traction Brake Company, Pittsburgh, Pa.
5 76	Inverted siphon for the Cambridge Marginal Conduit, at Lechmere Canal.	1	-	14,500 00 <sup>1</sup>	Hiram W. Phillips.
6 77 <sup>2</sup>	Castings, . . .	1	-	448 50 <sup>1</sup>	Gibby Foundry Company.
7 78	Sluice-gate in the Cambridge Marginal Conduit.	1	-	1,673 00 <sup>1</sup>	The Lockwood Manufacturing Company.
8 79	Structural steel for the Cambridge Marginal Conduit and the sluices.	4	515 00	467 00 <sup>1</sup>	H. P. Converse & Company.
9 80	Gate stems and guide brackets for the Lock and the Cambridge Marginal Conduit.	1	-	227 00 <sup>1</sup>	The Lockwood Manufacturing Company.
10 82 <sup>2</sup>	Temporary house for lock-gate and draw-bridge controlling apparatus.	3	675 00	578 00 <sup>1</sup>	David S. McCabe, Boston, Mass.
11 83 <sup>2</sup>	Electrical wire cables, .	2	718 76	591 43 <sup>1</sup>	F. M. Ferrin, Boston, Mass.
12 85	Plug drain valves for the Fens gate-house.	1	-	238 00 <sup>1</sup>	Coldwell-Wilcox Company.
13 86	Twisted steel rods for reinforcing concrete.	4	1,053 41	1,051 38 <sup>1</sup>	Aberthaw Construction Company.
14 Special Order. <sup>2</sup>	28-foot gasoline launch,	4	570 00 <sup>1</sup>	500 00	Baker Yacht Basin, Inc., Quincy Point, Mass.
15 Special Order. <sup>2</sup>	Engine and fittings for 28-foot gasoline launch.	- <sup>5</sup>	- <sup>5</sup>	716 00 <sup>1</sup>	Buffalo Gasolene Motor Company, Boston, Mass.
	Totals, . . .				

<sup>1</sup> Contract based upon this bid.<sup>2</sup> Contract completed.<sup>3</sup> Bids were upon designs submitted by bidders.

THE YEAR ENDING NOV. 30, 1907 — *Concluded.*

7.	8.	9.	10.	11.	12.	
Date of Contract.	Date for Completion of Contract.	Date of Final Estimate.	Prices of Principal Items of Contract.	Amount of Contract.	Payments made to Nov. 30, 1907.	
Sept. 12, '07,	Nov. 19, '07,	-	For the whole work, \$1,350.	\$1,350 00	-	1
June 25, '07,	Aug. 15, '07,	Oct. 4, '07,	For square twisted steel rods, 1.9375 cents and 2.1125 cents per lb.	1,032 19	\$1,032 19	2
Aug. 9, '07,	Dec. 27, '07,	-	For the whole work, \$495.	495 00	-	3
Aug. 30, '07,	-	-	For the whole work, \$1,393.20.	1,393 20	-	4
Sept. 12, '07,	May 1, '08,	-	For the whole work, \$14,500.	14,500 00	739 50	5
Aug. 28, '07,	Nov. 26, '07,	Oct. 15, '07,	For iron castings, \$0.11 and \$0.035 per lb.	439 65	439 65	6
Sept. 19, '07,	-	-	For the whole work, \$1,673.	1,673 00	-	7
Sept. 9, '07,	Dec. 8, '07,	-	For the whole work, \$467.	467 00	-	8
Sept. 30, '07,	Nov. 29, '07,	-	For the whole work, \$227.	227 00	-	9
Sept. 5, '07,	Sept. 16, '07,	Sept. 21, '07,	For the whole work, \$578.	578 00	578 00	10
Sept. 10, '07,	Sept. 17, '07,	Sept. 21, '07,	For rubber covered and leaded cables, \$0.465, \$0.36 and \$0.20 per ft., weather proof cable, \$0.21 per lb.	591 43	591 43	11
Nov. 4, '07,	Feb. 2, '08,	-	For the whole work, \$238.	238 00	-	12
Nov. 29, '07,	Mar. 1, '08,	-	For square twisted steel rods, \$1.92, \$2.02, and \$2.12 per hundred lbs.	1,051 38	-	13
Feb. 25, '07,	Apr. 15, '07,	May 11, '07,	For the whole work, \$570.	617 44	617 44	14
Feb. 26, '07,	Mar. 20, '07,	May 14, '07,	For the whole work, \$716.	716 00	716 00	15
. . . . .	. . . . .	. . . . .	. . . . .	\$1,983,895 51	\$1,012,242 13	

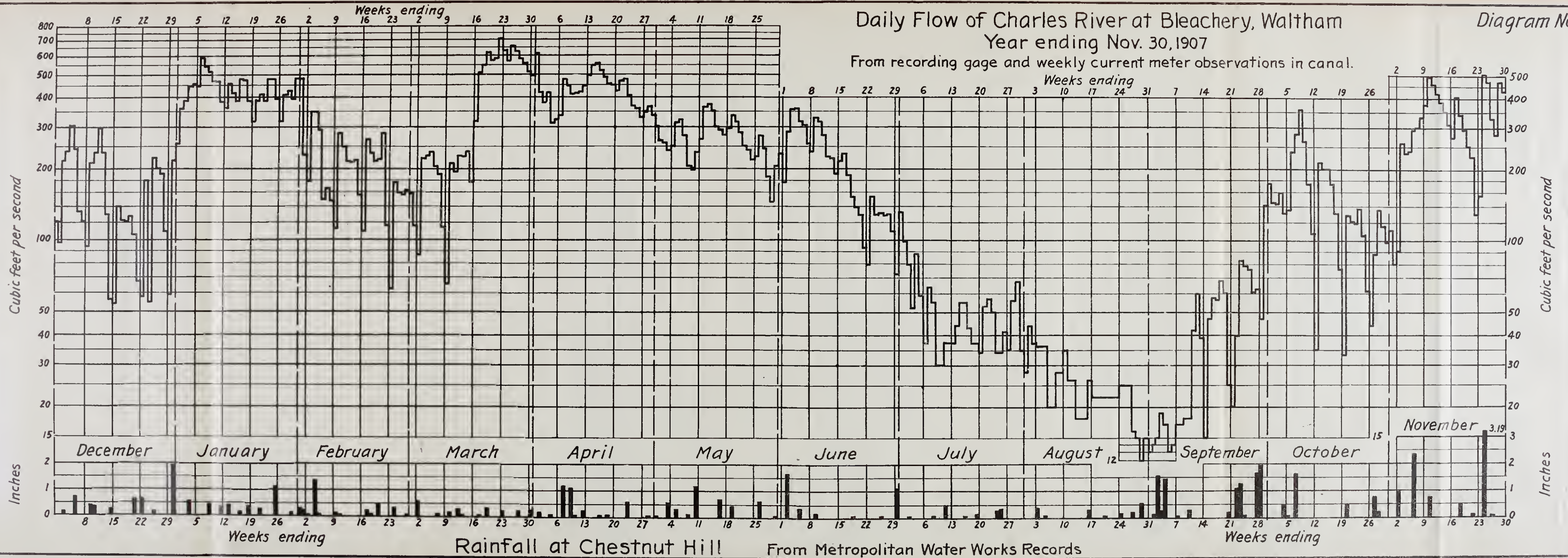
<sup>4</sup> Bids were upon different types of compressors.<sup>5</sup> Competitive bids were not received on this contract.





Diagram No. 1

Weeks ending



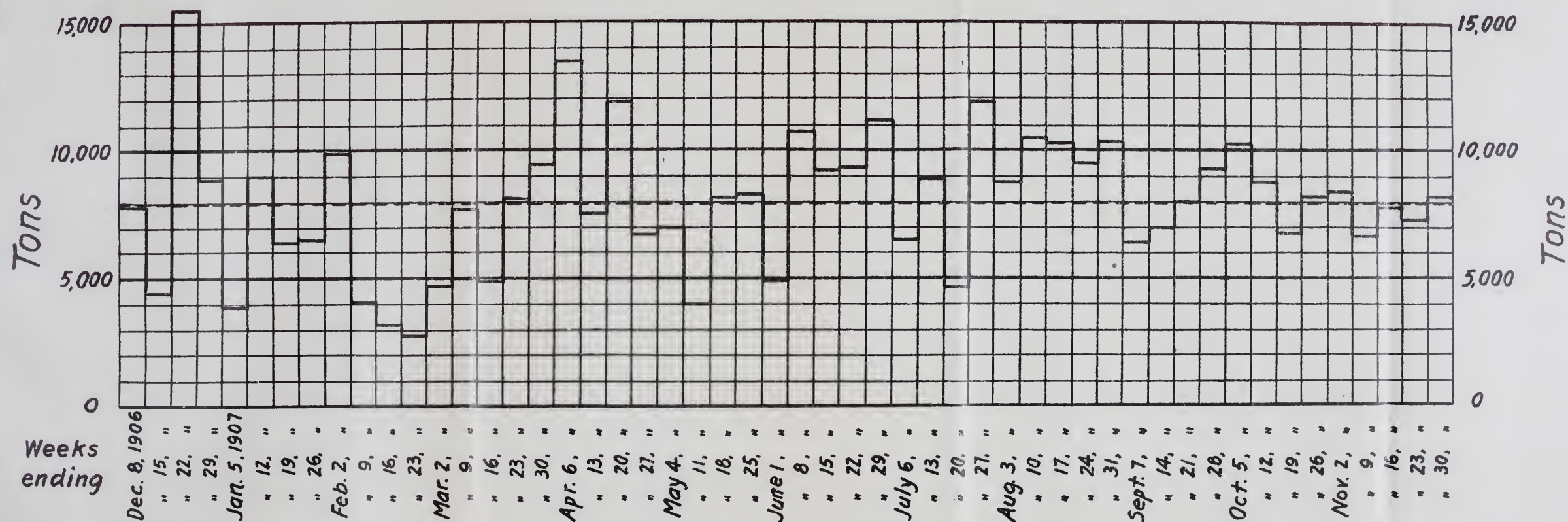


0.001 0.002 0.003 0.004 0.005 0.006 0.007 0.008 0.009 0.010 0.011 0.012 0.013 0.014 0.015 0.016 0.017 0.018 0.019 0.020 0.021 0.022 0.023 0.024 0.025 0.026 0.027 0.028 0.029 0.030 0.031 0.032 0.033 0.034 0.035 0.036 0.037 0.038 0.039 0.040 0.041 0.042 0.043 0.044 0.045 0.046 0.047 0.048 0.049 0.050 0.051 0.052 0.053 0.054 0.055 0.056 0.057 0.058 0.059 0.060 0.061 0.062 0.063 0.064 0.065 0.066 0.067 0.068 0.069 0.070 0.071 0.072 0.073 0.074 0.075 0.076 0.077 0.078 0.079 0.080 0.081 0.082 0.083 0.084 0.085 0.086 0.087 0.088 0.089 0.090 0.091 0.092 0.093 0.094 0.095 0.096 0.097 0.098 0.099 0.100

0.001 0.002 0.003 0.004 0.005 0.006 0.007 0.008 0.009 0.010 0.011 0.012 0.013 0.014 0.015 0.016 0.017 0.018 0.019 0.020 0.021 0.022 0.023 0.024 0.025 0.026 0.027 0.028 0.029 0.030 0.031 0.032 0.033 0.034 0.035 0.036 0.037 0.038 0.039 0.040 0.041 0.042 0.043 0.044 0.045 0.046 0.047 0.048 0.049 0.050 0.051 0.052 0.053 0.054 0.055 0.056 0.057 0.058 0.059 0.060 0.061 0.062 0.063 0.064 0.065 0.066 0.067 0.068 0.069 0.070 0.071 0.072 0.073 0.074 0.075 0.076 0.077 0.078 0.079 0.080 0.081 0.082 0.083 0.084 0.085 0.086 0.087 0.088 0.089 0.090 0.091 0.092 0.093 0.094 0.095 0.096 0.097 0.098 0.099 0.100



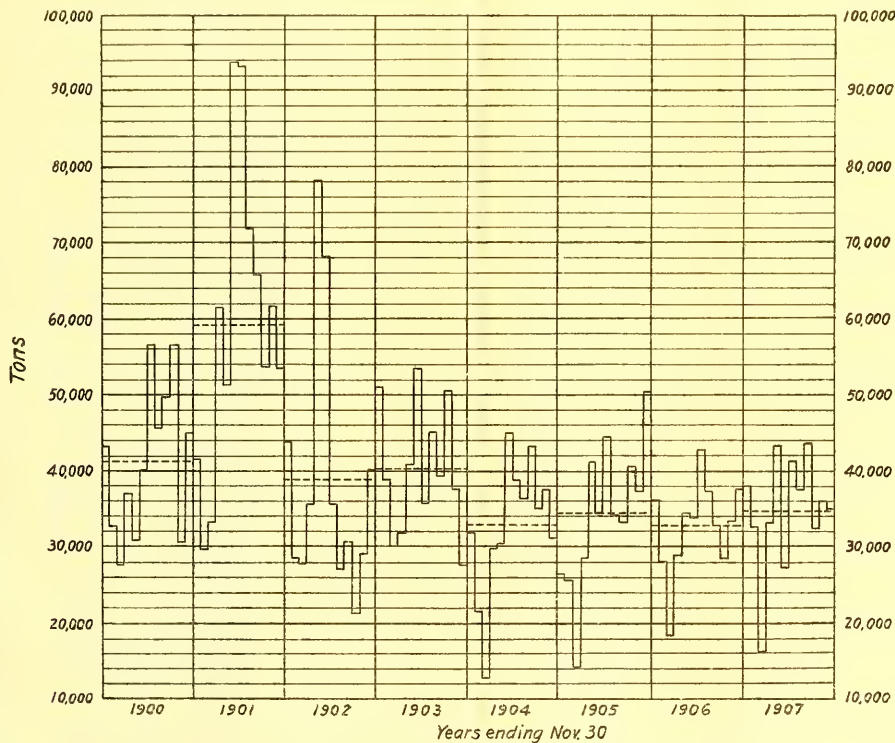
Weekly Tonnage passing Draw of Craigie Bridge  
Nov. 30, 1906 to Nov. 30, 1907



Dotted line is weekly average



Monthly Tonnage passing Draw of Craigie Bridge  
since Nov. 30, 1899



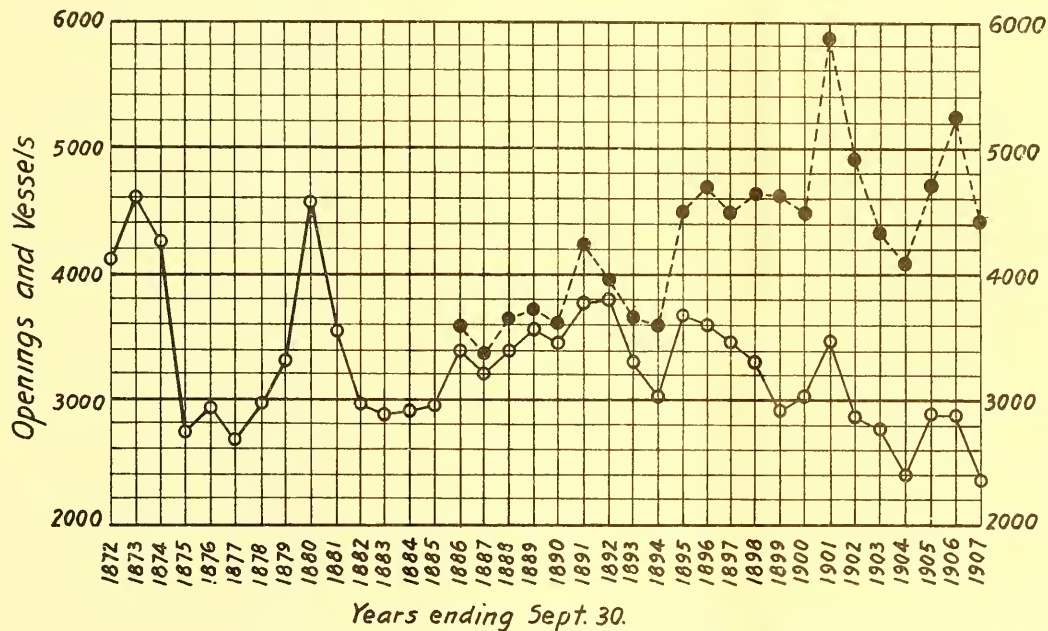
Dotted lines show monthly average



No.		Date		Description		Amount	
1		1880	Jan 1	Balance		100.00	
2		1880	Feb 1	Interest		5.00	
3		1880	Mar 1	Interest		5.00	
4		1880	Apr 1	Interest		5.00	
5		1880	May 1	Interest		5.00	
6		1880	Jun 1	Interest		5.00	
7		1880	Jul 1	Interest		5.00	
8		1880	Aug 1	Interest		5.00	
9		1880	Sep 1	Interest		5.00	
10		1880	Oct 1	Interest		5.00	
11		1880	Nov 1	Interest		5.00	
12		1880	Dec 1	Interest		5.00	
13		1880	Jan 1	Interest		5.00	
14		1880	Feb 1	Interest		5.00	
15		1880	Mar 1	Interest		5.00	
16		1880	Apr 1	Interest		5.00	
17		1880	May 1	Interest		5.00	
18		1880	Jun 1	Interest		5.00	
19		1880	Jul 1	Interest		5.00	
20		1880	Aug 1	Interest		5.00	
21		1880	Sep 1	Interest		5.00	
22		1880	Oct 1	Interest		5.00	
23		1880	Nov 1	Interest		5.00	
24		1880	Dec 1	Interest		5.00	
25		1880	Jan 1	Interest		5.00	
26		1880	Feb 1	Interest		5.00	
27		1880	Mar 1	Interest		5.00	
28		1880	Apr 1	Interest		5.00	
29		1880	May 1	Interest		5.00	
30		1880	Jun 1	Interest		5.00	
31		1880	Jul 1	Interest		5.00	
32		1880	Aug 1	Interest		5.00	
33		1880	Sep 1	Interest		5.00	
34		1880	Oct 1	Interest		5.00	
35		1880	Nov 1	Interest		5.00	
36		1880	Dec 1	Interest		5.00	
37		1880	Jan 1	Interest		5.00	
38		1880	Feb 1	Interest		5.00	
39		1880	Mar 1	Interest		5.00	
40		1880	Apr 1	Interest		5.00	
41		1880	May 1	Interest		5.00	
42		1880	Jun 1	Interest		5.00	
43		1880	Jul 1	Interest		5.00	
44		1880	Aug 1	Interest		5.00	
45		1880	Sep 1	Interest		5.00	
46		1880	Oct 1	Interest		5.00	
47		1880	Nov 1	Interest		5.00	
48		1880	Dec 1	Interest		5.00	
49		1880	Jan 1	Interest		5.00	
50		1880	Feb 1	Interest		5.00	
51		1880	Mar 1	Interest		5.00	
52		1880	Apr 1	Interest		5.00	
53		1880	May 1	Interest		5.00	
54		1880	Jun 1	Interest		5.00	
55		1880	Jul 1	Interest		5.00	
56		1880	Aug 1	Interest		5.00	
57		1880	Sep 1	Interest		5.00	
58		1880	Oct 1	Interest		5.00	
59		1880	Nov 1	Interest		5.00	
60		1880	Dec 1	Interest		5.00	
61		1880	Jan 1	Interest		5.00	
62		1880	Feb 1	Interest		5.00	
63		1880	Mar 1	Interest		5.00	
64		1880	Apr 1	Interest		5.00	
65		1880	May 1	Interest		5.00	
66		1880	Jun 1	Interest		5.00	
67		1880	Jul 1	Interest		5.00	
68		1880	Aug 1	Interest		5.00	
69		1880	Sep 1	Interest		5.00	
70		1880	Oct 1	Interest		5.00	
71		1880	Nov 1	Interest		5.00	
72		1880	Dec 1	Interest		5.00	
73		1880	Jan 1	Interest		5.00	
74		1880	Feb 1	Interest		5.00	
75		1880	Mar 1	Interest		5.00	
76		1880	Apr 1	Interest		5.00	
77		1880	May 1	Interest		5.00	
78		1880	Jun 1	Interest		5.00	
79		1880	Jul 1	Interest		5.00	
80		1880	Aug 1	Interest		5.00	
81		1880	Sep 1	Interest		5.00	
82		1880	Oct 1	Interest		5.00	
83		1880	Nov 1	Interest		5.00	
84		1880	Dec 1	Interest		5.00	
85		1880	Jan 1	Interest		5.00	
86		1880	Feb 1	Interest		5.00	
87		1880	Mar 1	Interest		5.00	
88		1880	Apr 1	Interest		5.00	
89		1880	May 1	Interest		5.00	
90		1880	Jun 1	Interest		5.00	
91		1880	Jul 1	Interest		5.00	
92		1880	Aug 1	Interest		5.00	
93		1880	Sep 1	Interest		5.00	
94		1880	Oct 1	Interest		5.00	
95		1880	Nov 1	Interest		5.00	
96		1880	Dec 1	Interest		5.00	
97		1880	Jan 1	Interest		5.00	
98		1880	Feb 1	Interest		5.00	
99		1880	Mar 1	Interest		5.00	
100		1880	Apr 1	Interest		5.00	

Diagram No. 4

## Yearly Traffic through Draw of Craigie Bridge



Number of openings shown thus —○—  
Number of vessels passing thus ---●---



6348.42

$\frac{11}{13}$

76







OCT 13 1926

